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THE PLACE OF SURGERY IN EARLY CARCINOMA OF THE BREAST.¹

By ALAN NEWTON, M.S. (Melbourne), F.R.C.S. (England), F.R.A.C.S., F.A.C.S.,

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THE Royal Australasian College of Surgeons is conducting a statistical investigation of the results of surgical treatment of cases of carcinoma of the breast which, at the time of operation, were included in Group A (operable) or Group B (borderline), and which had been operated upon prior to December 31, 1929. The investigation embraced patients operated upon in various public hospitals in Australia and New Zealand during a period of

¹ Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

ten years prior to this date, and also patients operated upon by various Fellows of the College in their private practices. It will thus be seen that, though there is a minimum five-year standard of survival, the majority of the patients were operated upon considerably more than five years ago. The investigation of the results of the treatment of public hospital patients was conducted in Adelaide by Alan Lendon, in Brisbane by A. E. Lee, in Melbourne by Robert Hadley, Kenneth Hadley and C. A. Marshal Renou, in Sydney by L. S. Loewenthal and R. J. W. Malcolm, and in Wellington by T. D. M. Stout. The private patients were operated upon by Sir Henry Newland in Adelaide, Sir Carrick Robertson in Auckland, H. B. Devine, Leo Doyle, Victor Hurley and Alan Newton in Melbourne, and Sir Alexander MacCormick, B. T. Edey and H. R. G. Poate in Sydney. The figures thus supplied were collected and analysed in Melbourne by G. R. A. Syme. The Council of the College is very

grateful to these men for the work that they have done. It has asked me to represent it at this Cancer Conference, not only to present the results of this investigation, but also to express its appreciation of the work done at these conferences and its desire that the College should be associated in any suitable activity directed towards the discovery of better methods of treatment of this disease.

The total number of patients was 1,621, but of these, 637 have not as yet been traced. The inquiry is being continued and it is hoped to publish more complete figures at a later date.

The results in a selected series of private cases usually compare favourably with those obtained in public hospitals. In Table I the figures relating to these two groups are given separately.

It will thus be seen that 57% of the traced private patients and 46% of the traced public hospital patients were alive and well more than five years after an operation for the removal of a carcinoma of the breast. It will also be noted that 8% of the deaths in each series occurred from causes other than this disease and that, therefore, approximately half of these patients should be assumed to have been cured of the carcinoma. In certain of the individual series of cases the "five-year or longer" survival rate was more than 60%.

The results in the operable group were naturally more satisfactory than those obtained in the borderline group, as will be seen from Table II.

There is a marked difference in the percentage alive and well in the two series in Group B, namely,

TABLE I.

Cases in Group A. Operable Stage.

Series 1. Private cases.

Total number of cases	225
Total number traced	157
Percentage traced	70

Observation.	Traced Patients.	Alive and Well.	Died of Carcinoma Mammæ.	Alive with Metastasis.	Died of Other Cause.	Died. Cause Unknown.
Number	157	90	48	2	14	3
Percentage		57	30		8	2

Series 2. Public hospital cases.

Total number of cases	383
Total number traced	239
Percentage traced	62

Observation.	Traced Patients.	Alive and Well.	Died of Carcinoma Mammæ.	Alive with Metastasis.	Died of Other Cause.	Died. Cause Unknown.
Number	239	110	102	8	18	1
Percentage		46	43	3	8	4

TABLE II.

Cases in Group B. Borderline Stage.

Series 1. Private cases.

Total number of cases	273
Total number traced	181
Percentage traced	66

Observation.	Traced Patients.	Alive and Well.	Died of Carcinoma Mammæ.	Alive with Metastasis.	Died of Other Cause.	Died. Cause Unknown.
Number	181	41	119	4	12	5
Percentage		22	66	2	6	3

Series 2. Public hospital cases.

Total number of cases	740
Total number traced	435
Percentage traced	59

Observation.	Traced Patients.	Alive and Well.	Died of Carcinoma Mammæ.	Alive with Metastasis.	Died of Other Cause.	Died. Cause Unknown.
Number	435	59	322	8	27	19
Percentage		14	74	2	6	4

22% in the private series and only 14% in the public hospital series. This is probably due to the inclusion of many advanced cases in the public hospital figures. In some hospitals the histories were not so complete as might have been desired, and it was therefore difficult, from the scanty information supplied, to determine whether some patients were in the borderline group or whether they were admitted to hospital for merely palliative operations.

It is regrettable that it had been found impossible to trace 637 patients at the time that these figures were compiled, but it is probable, for the following reasons, that this failure does not affect the accuracy of the deductions to be drawn from the above tables.

(A) Table III gives the results of a series of private patients, operated upon by two Fellows of the College, of whom 96% were traced.

23%, figures which again compare favourably with the general public hospital figures quoted in Tables I and II.

A study of these two groups of cases does not support the suggestion that the 637 patients who were untraced should be regarded as dead, with a consequent lowering of the percentage survival rate. In point of fact, it indicates that the greater the percentage of untraced patients, the better is the survival percentage.

This investigation therefore shows that the "five-year or more" survival rate in Group A varies from 46% to 64% and in Group B from 14% to 27%. It may be assumed that the average survival rate in cases treated throughout the country is 50% and 20% respectively, though these figures are below those obtained by various skilled surgical specialists.

TABLE III.
Series of Private Cases of which 96% were Traced.

Group.	Total Patients.	Alive and Well.	Died of Carcinoma.	Alive with Metastasis.	Died of Other Cause.	Not Traced.
A	53	34	16	0	1	2
B	45	12	23	2	3	5

In this series 64% of patients in Group A and 27% of patients in Group B were alive and well, a percentage which compares favourably with that obtained in the total series of private cases, of which only 70% in Group A and 66% in Group B were traced.

(B) Loewenthal and Malcolm, Syme Research Scholars of the College for 1935, have continued the investigation of patients operated upon in public hospitals in Sydney by making a search for records of death of untraced patients in the office of the Registrar-General. Their work will be made the subject of a separate communication, but I am permitted to give the figures shown in Table IV.

As has been stated, the minimum survival period in this investigation has been five years, and it is well known that a five-year survival does not imply that the disease is cured.

Table V indicates the time of survival after operation of the fatal cases in one private series which extended over a period of twenty-five years prior to December 31, 1929.

This table is of some importance in reference to the treatment of carcinoma of the breast by the interstitial radium technique, which, as yet, can be judged only by a three-year survival rate. Raven and Hare⁽¹⁾ have furnished a preliminary report to the National Radium Commission on the results

TABLE IV.
Further Figures from Five Sydney Public Hospitals.

Group.	Total Patients.	Traced Patients.	Alive and Well.	Alive with Metastasis.	Died of Carcinoma.	Died of Other Causes.	Alive but Untraced.
A	190	145	67	17	54	7	45
B	357	314	42	30	232	11	43

The figures in the fifth and sixth columns of this table include all the deaths of patients who have been operated upon for carcinoma of the breast in these hospitals for ten years prior to December 31, 1929, which have occurred in New South Wales. It is therefore justifiable to assume that the patients in the untraced group are still alive, the only source of error being the fact that some may have died in other States. As it is improbable that many patients of the general hospital class have migrated elsewhere, it seems that the approximate survival rate of the patients in Group A is 58% and in Group B

of this method of treatment. The report shows that the three-year survival rate in Group A is 66.1%,

TABLE V.

Period between Operation and Death.	Percentage of Total Deaths.
Under three years	67
Between three and five years	20
Over five years	13

and in Group B 37.2%. A similar investigation is being made by the Department of Health of the

Commonwealth of Australia, but these figures are as yet too small to be of value. It is interesting to note that the three-year survival rate in the operable group in this series is equivalent to the five-year or more survival rate in the series of patients, treated surgically, in which 96% were traced (see Table III). These figures are particularly important in view of the fact that, as Clendinnen⁽²⁾ has said:

A five-year symptom-free period is even of less value in a consideration of the results of treatment with radium, which in many cases leaves some cells undestroyed and persisting in an embalmed state surrounded by fibrous tissue remaining latent perhaps for years.

Statistical investigations are of limited value, but the results of this investigation, when compared with a similar inquiry into the results of radium therapy in early cases of carcinoma of the breast, clearly show that better results are obtained by surgical removal and that the statement made by Clendinnen⁽²⁾ that "the old teachings of surgical text books cannot, in the light of recent statistics, be upheld and it is becoming more and more doubtful whether surgical intervention is justified at all", cannot be accepted as true. This statement was doubtless based upon incomplete and, therefore, misleading statistics concerning the value of surgical treatment. It will be most regrettable if a spirit of conflict between surgeons and radiotherapists should arise. This will undoubtedly be fostered if extravagant claims are made in support of one or the other of these methods of treatment. The whole position has been very well summarized recently by H. M. Moran,⁽³⁾ who has pointed out the limitations of surgery and the indications for radiotherapy in a paper equally admirable from the standpoints of knowledge and literary expression. The axioms contained in his paper must receive general approval. As he has stated, the term "carcinoma of the breast" embraces a variety of tumours of widely different character and behaviour. It is unfortunate that it is not possible, at this stage, to correlate the figures given in this paper with the type of tumour found in the breast after removal. It is hoped that a report bearing on this aspect of the question will be published by the College at a later date. Many surgeons do not yet agree with his opinion that pre-operative radiation is of value in the treatment of this disease, nor can there be general agreement with his statement that there should be more frequent removals of unhealthy breasts than at present is sanctioned by practice or sentiment. The wide dissemination of advice of this nature would lead to the unnecessary removal of many breasts afflicted with cystic mastitis, a condition which is an infrequent precursor of malignant disease.

These and other debatable points in connexion with the treatment of carcinoma of the breast indicate that there should be the closest cooperation between all those branches of our profession concerned with the use of the method of diagnosis and treatment at present at our disposal. Dr. Cumpston⁽⁴⁾ has pointed out that "the annual cancer conferences consist largely of communings between

the clinician and the physicist, and this gives them their great value, a value which must never be overshadowed by clinical details or demonstrations of surgical technique". This is doubtless a true summary of the value of these conferences, but in order to obtain an adequate clinical cooperation in the treatment of malignant disease and in order to instruct the general body of the profession in all the branches of this treatment, it seems desirable to hold, in addition, purely clinical conferences in the various large centres of population in the Commonwealth. I am therefore authorized by the Executive Committee of the Royal Australasian College of Surgeons to invite this conference to hold a subsidiary clinical conference in association with the annual general meetings of the College, which are held in the various capital cities in rotation. The College will set apart time for these meetings and will invite all members of the profession to be present. If this can be arranged, it will help to answer, not only the question of the rôle of surgery in the early treatment of breast carcinoma, but also many other questions in relation to this disease.

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- ⁽³⁾ H. M. Moran: "The Treatment of Mammary Cancer", *The Medical Journal of Australia*, April 20, 1935, page 486.
- ⁽⁴⁾ J. H. L. Cumpston: "The National Cancer Research Organization in Australia", *Transactions of the Australasian Medical Congress (British Medical Association)*, 1935, page 13.

THE PLACE OF SURGERY IN THE TREATMENT OF THE LATER STAGES OF CANCER OF THE BREAST.¹

By B. T. EDYE,

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In order to understand the place of surgery in the treatment of the later stages of cancer of the breast one should begin by defining those types of advanced disease that may be assisted by surgery. A definition, however, is difficult to formulate in a few words, but as I continue I think you will appreciate the types of disease the treatment of which it is my task to discuss. Unfortunately a considerable number of patients, when first seen, are affected by the disease to such an extreme degree that they are beyond surgical aid or the disease is inoperable. Some of the factors which determine this state of inoperability are: fixation of the tumour to the chest wall, involvement and fixation of high axillary lymphatic glands, involvement of cervical or opposite axillary lymphatic glands, diffuse invasion of the skin and subcutaneous tissues, and distant metastasis. In all such cases, if active

¹ Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

treatment is considered advisable, radiotherapy should be recommended. This may retard the growth, heal ulcerated surfaces and relieve pain, especially that due to deposits in bone. Occasionally a carcinoma considered inoperable may respond so well to radiation that subsequent operation may be deemed advisable. For example, the primary tumour of the breast may be a large one, and the axillary lymphatic glands extensively involved, while, however, there is no evidence of the disease elsewhere. In such circumstances the radical operation may be carried out in the hope that the disease may be completely removed before further spread has occurred; or, if this event has already taken place, the possibility of ulceration may be avoided and the progress of the disease retarded by eliminating the primary source of the tumour cells. In certain of these advanced cases, when the patient is informed of the nature of the disease, the mental anguish is so great that this sometimes determines the issue in favour of operation where there is some prospect of eradicating the disease locally, or at

least holding it in check until such time as the patient becomes exhausted by distant metastasis.

Having mentioned the occasions, unhappily few, on which surgery may be helpful in those types of carcinoma of the breast classed as inoperable, I shall now consider the less advanced cases. These are included in the Stage II group of the Royal Australasian College of Surgeons' classification. This group comprises all cases in which there is doubt regarding the practicability of complete local ablation by surgical means and in which one or more of the following characters is noted: (i) the tumour is large, (ii) the tumour is fixed to the skin or deep fascia or both, (iii) the lower axillary glands are definitely involved, (iv) the tumour is present in the medial portion of the breast with probable invasion of mediastinal glands.

To give an approximate idea of the value of surgery in this group I append two tables, the figures of which are included in the statistics submitted by Mr. Alan Newton.

TABLE I.¹

Five year results of cases of carcinoma of the breast, Stage II, treated primarily by radical surgery at five Sydney hospitals in the years 1918 to 1929. Some operations were followed by radiation therapy.

Age.	Total.	Total Traced.	Total Untraced.	Alive and Well.	Alive with Metastases.	Total Surviving.	Died at Operation.	Died of Other Causes.	Died of Cancer of Breast.
Under 40	61	55	6	1	7	8	1	1	45
40 to 60	217	184	33	27	19	46	6	4	128
Over 60	77	73	4	14	4	18	4	6	45
Totals	355	312	43	42	30	72	11	11	218
Percentage of total	—	87.8	12.2	11.8	8.4	20.0	3.0	3.0	61.4
Percentage of traced cases	—	—	—	13.4	9.6	23.0	3.5	3.5	69.8

¹ This table was compiled by Dr. L. S. Loewenthal and Dr. R. J. W. Malcolm.

TABLE II.²

Five year results of cases of carcinoma of the breast, Stage II, treated primarily by radical surgery by Sir Alexander MacCormick and Dr. E. T. Edye in the years 1921 to 1929. Some operations were followed by radiation therapy.

Age.	Total.	Total Traced.	Total Untraced.	Alive and Well.	Alive with Metastases.	Total Surviving.	Died at Operation.	Died of Other Causes.	Died of Cancer of Breast.
Under 40	12	8	4	2	—	2	—	—	6
40 to 60	53	42	11	8	—	8	—	4	30
Over 60	23	15	8	2	1	3	—	1	11
Totals	88	65	23	12	1	13	—	5	48
Percentages of totals	—	74.0	26.0	13.6	1.2	14.7	—	5.6	54.5
Percentages of traced	—	—	—	18.4	1.5	20.0	—	7.6	73.8

² This table was compiled by Dr. Stanley H. Lovell.

These tables were built up from data collected from *questionnaires* and from the Registry of Deaths. Thus it may be assumed that they give a fairly accurate measure of the mortality rate, but a poor estimate of "cures", as these latter would form a large proportion of the cases listed "not traced", which, in most instances, means that the patient's name had not been found in the records of the Registry of Deaths. In respect to the "cures", they are therefore hypercritical. This is especially to be noted in Table II, in which 26% of patients were untraced, as compared with 12% in Table I. The cases comprising Table II are nearly all drawn from private records.

It will be noted that while some of these patients were treated by post-operative radiation, it is not possible to produce comparative figures to indicate its value. My own impression is that post-operative radiation is useful in some cases in that it will retard local recurrence and cause obvious nodules of growth to disappear completely. In other cases the recurrences appear to be very little influenced by radiation, and I have frequently noted the development of nodules in or adjacent to the scar where the radiation had been most intense. Pre-operative radiation, in my experience, has been employed only in recent years, and for practical purposes the tables submitted may be regarded as representing the value of surgery alone in the treatment of the later stages of cancer of the breast.

The figures show that of the traced patients approximately 13% in Table I and 18% in Table II were alive and well at the end of five years, and that 70% in Table I and 74% in Table II had died from cancer of the breast in that period.

Though not shown, it was found that approximately 9% of those traced were alive and well at the time the tables were compiled in December, 1934.

Of six patients in Table II who reported as still being alive and well, two were operated upon a little over nine years ago, one seven years ago, two six years ago, and one five and a half years ago. One patient lived for nine years after operation and then died from another cause. Five succumbed to the disease from six to seven years after operation. It is clear that many of those in the Stage II group, when advice is first sought, are already beyond hope of cure by any form of local treatment because unrecognizable distant metastasis has occurred. Even X ray examination of the bones and chest may not reveal well established deposits. That this is possible was demonstrated by the following example.

I recently had a patient under observation who had cervical gland metastasis subsequent upon radical amputation of the breast. She complained of rheumatic-like pains in her left hip. Metastasis was suspected, but X ray examination revealed no abnormality of the bones. A few weeks later, when returning from golf, she suffered a spontaneous fracture of the upper third of the left femur.

Even though patients are classified as "alive and well" at the end of five years, this, of course, does not mean that they are free from disease, as it is

well known that metastases may not become apparent for ten or more years.

I have at the present time a patient under my care who had a radical operation for carcinoma of the left breast performed when she was twenty-seven years of age. Fourteen years later a small return of the growth was discovered beneath the scar. In the meantime she married and had a family. The recurrence was compared with the original growth and was found to have the same histological structure. She exhibits no evidence of distant metastasis and her general health is excellent.

It is obvious that a number of the "cures" are really examples of extreme retardation or slowness of growth of the tumour cells.

In some of the borderline cases in which it has been decided to operate it is found that the involvement of the axillary contents and adjacent tissues is more advanced than was anticipated and that complete local extirpation of the growth is impossible. These patients, like those with unrecognizable distant metastases, are already beyond the aid of surgery.

An important aspect of the problem, and one usually not stressed in any discussion, is the question of local eradication of the disease apart from any reference to distant metastasis. It would be instructive if figures were compiled to indicate in what percentage the disease showed no return locally after any form of treatment in patients still alive, or up to the time of death in those who have succumbed. Sir Alexander MacCormick often remarked that, even in the later stages, the disease could be eradicated locally by surgery in a high proportion of cases and that, if death occurred, it was usually due to distant metastasis.

This statement was abundantly supported during the preparation of the above tables. Therefore, as all our efforts at the present time are mainly directed towards the removal or destruction of the disease locally, we should confine our investigations to the areas treated when assessing the value of the various forms or combinations of treatment. There is no doubt that surgery alone can and does secure local elimination of the disease in a large percentage of cases in the Stage II group.

So far my remarks have been concerned with results up to the end of the year 1929, during which time I had little opportunity to observe the effects of pre-operative radiation. Since that year I have operated upon a considerable number of patients in the later stages of the disease when a course of deep X ray therapy had been administered beforehand. The result of the radiation varied, but almost all patients were improved, and some to a remarkable extent. The effect was most noticeable on the axillary lymphatic glands, which were sometimes so reduced as to become impalpable. The primary tumour, though reduced in size, did not respond so strikingly. Where there was ulceration, healing usually occurred, an important factor in securing asepsis during operation. It has been my practice to allow six to eight weeks to elapse after the completion of the deep therapy before operating. This plan was adopted to give time for the reaction

to subside, as I found that earlier operation was fraught with danger from hæmorrhage. In one instance, when the operation was performed in the stage of reaction, hæmorrhage was so severe that the patient was saved only by prompt blood transfusion. Healing after operation was generally satisfactory. The specimens, on pathological examination, showed areas which were necrosed or which were undergoing necrosis, but also areas in which the tumour cells appeared to be little, if at all, affected by the radiation. This was noted in all instances in the primary tumour and the axillary lymphatic glands. Professor D. A. Welsh had examined a number of these specimens and, I believe, will comment on this aspect of the subject today. Sufficient time has not elapsed to evaluate the ultimate influence of pre-operative X radiation on the course of the disease, but it is hoped that it will soon be possible to arrive at a better understanding of this problem. There are many factors to be considered, and amongst surgeons there is still much difference of opinion in regard to the interval that should be allowed to elapse between the completion of the course of radiation and the operation.

The findings on pathological investigation of breasts submitted to pre-operative radiation have led me to believe that the primary tumour cannot with certainty be destroyed by X radiation. For this reason we cannot depend on this form of treatment alone, but should follow it by the radical operation. Distant metastases, if established, will sooner or later betray themselves, but, with rare exceptions, they are beyond the hope of cure by present-day methods of treatment. Unless we can discover some means of annihilating them, or unless we can induce those afflicted with the disease to seek treatment in the earlier stages, I believe there is little prospect of materially improving the results shown in the tables I have submitted.

Acknowledgements.

My thanks are due to Dr. L. S. Loewenthal and Dr. R. J. W. Malcolm for permission to publish Table I, and to Dr. Stanley H. Lovell, who compiled Table II.

PLACE OF DEEP THERAPY IN CARCINOMA OF THE BREAST.¹

By A. T. NISBET,
Sydney.

THE treatment of malignant disease by any of the more powerful forms of irradiation is really of such recent origin that although the mass of figures supplied by the Commonwealth Government gives much information in other directions, it is extremely difficult to deduce facts of great value as regards the results obtained from radiotherapy. For

instance, in New South Wales it was not until 1931 that any attempt was made to give a malignant breast irradiation before operation, and even now the percentage of patients who have this form of treatment is extremely small. The surgeon and the patient have not been educated as yet to the value of this treatment cycle.

It will be some years yet before the value of radium and X rays in malignant disease of the breast can be shown statistically. At the present moment perusal of the literature from other countries shows that there is diversity of opinion on the effects of radiation after operation has been carried out, although this method has been in vogue in certain clinics for many years. The rapidly changing apparatus and the improvement in technique are, in my opinion, the reason for this argumentative state of affairs. Really it is only in the last four or five years that, with the help of the physicist, biologist and chemist, the radiotherapist has been able to evolve a form of treatment that has placed X radiation in a position in which modern medicine must cooperate in the treatment of malignant disease.

Mastitis.

Inflammatory condition of the breast is included here on account of the great difficulty at times in differential diagnosis between this and early carcinoma. This difficulty is increased when the patient is between twenty-seven and thirty-five years of age. At times, of course, it is impossible to make a definite diagnosis without cutting into the tumour. In cases of true mastitis in young women I feel it is wrong to remove the breast when X ray therapy will relieve the condition. Sometimes in these patients, after the pain has ceased to be troublesome and the acute condition has subsided, there remain a few rounded cysts which do not disappear, but which usually give no further trouble. If the cysts are large or numerous, they are easily removed without interfering with normal breast function. It is to be noted that at no time in my experience have I found X radiation interfere with lactation at a later date, and have even found that irradiation given in the early months of pregnancy has not prevented breast feeding of the child a few months later. Also the irradiated breast has given a normal amount of milk without any unusual discomfort to the nursing mother.

Mammary Tumour without Enlarged Glands.

In early operable cases we have reached a position in which it appears most important that we should decide whether it is advisable to remove the breast radically with or without pre-operative irradiation. From our own experience there appears to be no doubt that radiation given pre-operatively is, in the state of our present knowledge, the first line of treatment. The tumour in the breast becomes smaller and more discrete; the patient as a result feels mentally better, often puts on weight and is generally more fitted to undergo the surgical adventure.

¹ Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

In a young woman with a tumour of the lateral quadrant of the breast we have to ask ourselves, in these cases above all: "Is surgery the treatment of choice?"

In the early part of this year a woman, aged twenty-nine, was sent by a surgeon for diagnosis and treatment. There was found a rounded mass about the size of a golf ball in the lateral half of the left breast, towards the axillary tail, and also a definitely enlarged gland in the left axilla. Clinically there appeared to be no doubt that the growth was carcinomatous. Deep X ray therapy was given to four ports, and six weeks afterwards the mammary mass had become flat and fibrous, whilst the enlarged gland in the axilla had, to all intents and purposes, disappeared. What is the next step?

I know of no patient with mammary carcinoma under the age of thirty who has lived five years after surgical operation. In fact, one and a half to two years seem to be the maximum expectation of life.

In the case quoted the disease was not in an early stage, but fairly advanced; the patient is in excellent health otherwise and is engaged to be married. After due consultation with her other medical advisers it was decided to repeat the course of deep X ray therapy, and a month after that to review the position again. That, however, only puts off the day when a decision must be made. Is a radical amputation to be done or not? It would be a terrible crime to experiment with human life, but if we know that surgery is not going to cure the disease, are we not justified in attempting some other form of treatment? Of course, if a case such as this were to remain quiescent, there would always be the doubt as to diagnosis, but if we look at things from the patient's point of view, as long as good health remains the diagnosis is of secondary importance.

The one objection to pre-operative treatment seems to be the length of time that the patient has to wait before the breast is removed. A full course of X radiation takes about three weeks, and it is advisable not to operate until four to six weeks after X ray treatment has been completed. This means that if a pre-operative course of irradiation is given, it is seven to nine weeks before operation can take place. If radical amputation is done before this, the risk of hæmorrhage due to hyperæmia of the part is very great, but even more important than that is the fact that fibrous tissue has not had time to form around and through the cancerous tissue, and by so doing to lessen the possibility of dissemination. Also the action of X rays on the malignant cells themselves has not reached its maximum. Looking at a section of one of these tumours six weeks after X ray treatment, there is seen a very great increase in fibrosis both at the periphery of the growth and throughout the bulk of the mass itself. In between these fibrous strands malignant cells are seen lying, some apparently active, some in different stages of disintegration. The subsequent history of the cells that are active is apparently not known, and until the pathologist can throw some further light on this subject, the continued and persistent argument as to whether

any form of X radiation is the correct treatment for *carcinoma mamma* will proceed without our arriving at any definite conclusion. It seems that these carcinomatous cells must do one of three things:

First, they may lie dormant surrounded by an impenetrable wall of fibrous tissue, unable to escape into the lymphatic or blood stream and not proliferating to form a larger tumour mass. In support of this possibility there is the case of an old woman (M.M.).

This patient, aged seventy years, in 1928 was to have a radical amputation of the breast performed, but took the anæsthetic so badly that after a few minutes the operation was discontinued. However, a biopsy was taken, the growth found to be scirrhus in type, and the patient was sent for deep X ray therapy. Today there is a hard fibrous mass in the right breast, with no evidence of metastatic invasion or of local recurrence, and but for her advanced cardiac lesion the patient is in very good health.

Secondly, it seems possible that after a more or less lengthy period these incarcerated cells resume an active function or are able to permeate the fibrous walls and to give rise to new lesions in surrounding parts of normal breast tissue. Here it should be mentioned that although during the course of irradiation the whole of the *mammæ* is exposed and is subject to as much X ray treatment as the tumour itself, on microscopic examination of this healthy portion there is not seen this increase in fibrosis and other concomitant changes. Examples of recurrence after irradiation are seen in the inoperable fungating type, where after treatment often the fungations have disappeared and the skin has grown over the open wound. In these cases the tremendous mass of carcinoma cells appears to prevent the formation of sufficient fibrous tissue to keep the neoplastic cells imprisoned, and there does not appear to be enough normal tissue left in the tumour structure to provide for the growth of this defensive mechanism.

Thirdly, there has not been time, nor probably has the pathologist had sufficient material, to tell whether these enclosed cells, apparently active six weeks after irradiation, could all eventually break up, leaving no malignant disease present.

What is going on inside a flat, fibrous mammary mass which has been subjected to irradiation in some form three, four or five years earlier? We have cases, unfortunately few in number, of operable breast carcinoma in which the patient has refused surgery, yet at these periods they show no increase in the size of the tumour and no evidence of metastatic invasion. Has irradiation in large doses stifled these cells? These cases are most instructive because the tumour was so small that it could be irradiated very completely and the amount of healthy breast tissue appears to have been sufficient to provide the biological, and possibly chemical, agents to frustrate any further growth. From the foregoing it can be seen that, without help from workers in pathology, this problem of the ultimate result of irradiation on malignant cells will remain unsolved.

Returning to the enforced delay in operating after X ray treatment, if, as has been shown, by the mere fact of waiting a few weeks the patient has built up some form of resistance to the actively growing neoplastic lesion, and if that resistance occurs not only in the tumour itself but in the surrounding healthy parts, it seems that the surgeon himself, for the patient's sake, should welcome this period of waiting wherein the disease is not being allowed to progress, but rather is waging war on itself.

Mammary Tumour with Enlarged Axillary Glands.

When the disease has reached the stage at which enlarged axillary glands are palpable, the survival rate from surgery alone decreases in a remarkable manner. What has been said about pre-operative irradiation in the earlier stage applies, in my opinion, much more here. Once the growth has reached the glands dissemination occurs more commonly, and if we can do something to block the spread we are going to increase our rate of "apparent cures". By building up a fibrous wall around the malignant growths it seems reasonable that we might achieve something in this direction. The dissecting out of the glands in the axilla, at no time the simplest of surgical procedures, does not apparently become more difficult after irradiation, although there is usually a little more bleeding than ordinarily.

Mammary Tumour with Enlarged Axillary and Supraclavicular Glands.

In discussing mammary tumour with enlarged axillary and supraclavicular glands we are reaching a stage of the disease in which the ultimate prognosis is very far from good. In this type surgery appears unavailing, and even if extensive dissection is done, with resection of portion of the clavicle, the expectation of life is short indeed. Irradiation appears to help these poor people for some length of time—it keeps their breast tumour and their metastatic glands in check, and while they live they are without the pain, the hospitalization, the mutilation and the discomfort which comes from massive oedema of the arm and from the scarring of tissue around the cervical plexus. Some swelling of the arm occurs in about 15% of cases seen, and I am rather inclined to the belief that, when this condition occurs, post-operative irradiation to the axilla increases the scar tissue in that area and so makes the oedema worse.

In three cases during the past twelve months Kondoleon's operation has been performed when the oedema has been extreme, and in each case a great degree of relief has been obtained.

The Inoperable Mammary Tumour.

A large percentage of cases seen both in public hospital and private practice are of the inoperable stage. A patient with a mass fixed to the ribs and glands in the axilla is inoperable, but after irradiation the tumour may become free from the chest wall and the axillary glands become smaller. This type of tumour then clinically becomes operable,

but possibly this is not the wisest form of procedure, and one cannot feel that the prognosis is very good whether the breast is removed or not. Usually in the short period (three years) during which we can safely review these cases with all fairness to deep X ray therapy, it has been found that at a later date supraclavicular glands enlarge or metastases occur elsewhere in the body. Although surgery is advocated in this class of case at the present time with the remote possibility of removing the entire growth, one feels that in ninety-nine cases out of a hundred the patient is being subjected to a mutilating and painful operation without any chance of a permanently beneficial result.

Fungating and Ulcerating Mammary Tumour.

There is apparently no surgical procedure which can assist the patient when the growth has arrived at the fungating and ulcerating stage. However, if X radiation can reduce the size of the growth and to some extent clear up the sepsis, it keeps the patient more comfortable. X rays certainly retard the growth and, as these patients are usually elderly people, it often allows them sufficient respite from the fetid odours and the continual dressings so that in the end they are carried off by some other ailment.

Recurrences Around Scar.

As regards the question of recurrent nodules arising around the scar, in my opinion this depends to a large extent on whether the scar is fixed to the underlying thoracic wall or not. When all the subcutaneous fat and muscle have been removed and the skin becomes attached to the ribs, the risk of recurrence is much greater than in those patients in whom the skin is freely movable. The reason for this appears to be that the highly stretched skin with no underlying tissue has little nourishment from lymph and blood vessels and often takes a long time to heal, with the result that small unhealed areas remain or ulcerations occur at a later date. It is at the edge of these areas that the skin appears to take on a malignant change once again. In appearance the growing edges look almost epitheliomatous, but when examined microscopically they prove to be similar to the original mammary tumour. It has been a surgical maxim that as much as possible of the tissues between the thoracic wall and the skin should be removed at operation. However, I feel very strongly that if in radical amputation of the breast it is possible to leave a small amount of adipose tissue underneath the scar, so that when healed it is freely movable over the chest wall, the risk of recurrence is very greatly lessened.

Another point about this loose scar is that if nodules do occur in the surrounding skin, they do not become fixed to the ribs and infiltrate the bone itself. Once this happens any form of treatment appears useless, and, no matter what may be attempted, this infiltrating ulcer does not respond to treatment.

From the irradiation side one may stave off the fatal day by giving a tremendous dose to a small

area, sufficient in fact to cause a necrosis, not only of the superficial tissues, but also of the underlying bone.

Age Incidence.

I feel that in the compilation of statistics not sufficient notice or prominence has been given to the age of the patient. If a patient over sixty years of age is found to have a hard scirrhus mass in a breast, the prognosis is not so bad as is often thought. The surgeon may perform a local ablation of the breast or possibly a radical amputation; the radiologist may irradiate the tumour and the nearby glands. I do not think it very much matters which is done, and I feel that the result in either instance will be quite good and that the patient will probably live for years.

Between forty and fifty years of age the outlook is not so hopeful. Here, with a similar clinical picture, the risk of metastases and recurrences is much greater. In these cases I feel strongly that pre-operative irradiation is most valuable and should be given in every case. After this has been done I think that, in the present state of our knowledge, radical amputation should be performed, and if any glands are found infected with carcinomatous cells post-operative irradiation should be given to the glandular areas. If this line of treatment is carried out, we can at least feel that we have not left undone anything that can possibly prevent a recurrence.

It is in the young women under forty, and particularly about the age of thirty, that the outlook seems so disastrous. Metastases are rapid, the cells having travelled to other parts of the body often before surgery is contemplated. The responsibility of using irradiation methods alone is terrific, but it is one that must be considered if in patients of this age surgery does not mean any prolongation of life. J. Burton Lee, in "Carcinoma of the Breast in the Young", in discussing patients under forty years of age, says that if the breast is largely occupied by tumour tissue, if axillary nodes are extensively invaded, or if any cutaneous nodules are present, the condition should not be treated surgically. In the operable cases a pre-operative cycle of high voltage X ray therapy should be given.

This sums up to a certain extent very concisely the present problem, but I feel that in years to come we shall find that Lee has not gone quite far enough.

Radiographic Examination.

Two matters concerning the pulmonary tissue in carcinoma of the breast I consider of great importance:

1. Every patient should have a radiograph taken of the thorax before any form of treatment is commenced. More than once patients have been sent for post-operative irradiation within a fortnight of their operation, and when a film of the chest is taken the lungs have been found to be studded with metastatic growths. These must have been there before operation was performed, but no X ray examination of the chest had been made.

2. Fibrosis of the lung. In all cases of breast cancer treated with deep X rays a high filtration of copper must be used if adequate dose through several fields is to be given to the breast. In 1923 we commenced with half a millimetre of copper filtration; later we used one millimetre; but it was not till 1928, when two millimetres of copper became the least thickness of copper to be inserted between the tube and the patient, that fibrosis of lung tissue was eliminated. I can well remember in the early days the wretched plight of the poor patient with one lung almost completely fibrosed, adhesions between the pulmonary and costal pleural membranes, the gasping for breath and the continuous pain. It is a marvel that deep therapy survived as a form of treatment. However, since the use of two millimetres or more of copper filtration there has not been seen one definite case of lung fibrosis which could be ascribed to X ray treatment.

Technique.

With modern apparatus giving higher and more constant voltage and necessitating the increase of filtration, a much greater number of *r* units can now be given to the tumour without in any way damaging the skin. With these higher voltages extra filtration of the X ray beam must be used in order that the time during which a patient is under treatment each day may not be too short. Following on the work of the biologists and physicists, we have attempted to keep each daily dose within the time limits in which cell mitosis is most rapid and frequent.

Four ports of entry are found to be most suitable, one medially and one laterally to the breast itself, one anteriorly and one posteriorly to the supra-clavicular and axillary glands. The size of the field is usually 17.5 by 12.5 centimetres (seven by five inches), but this, of course, is varied according to the size and thickness of the breast and the weight of the patient. A filter of three millimetres of copper, five milliamperes of current, 275 kilovolts, and a focal skin distance of sixty centimetres are the other factors.

Four hundred (international) *r* units are delivered to one port daily until the skin has received a total dose of 2,000 *r* or over to each of the four areas. Time taken to deliver 400 *r* under the above conditions is eighteen minutes.

In advanced inoperable cases this course may be repeated in six weeks' time, or possibly a certain field may be picked out for further treatment.

When a patient is sent for treatment after operation and there is no evidence of any ulceration or fixation of the scar, it is usual to treat the glandular areas alone, using either two or three ports of entry, anteriorly, posteriorly and possibly laterally.

With the above technique, despite the large number of *r* delivered to the skin, no redness occurs, and the term "X ray erythema" under these conditions is an expression of the past. The skin shows practically no alteration for a period of three weeks, when a dusky browning occurs, with the epidermis

commencing to desquamate in very fine scales. This pigmentation gradually increases until the skin of the irradiated areas becomes almost black. No pain or discomfort of any nature is noticeable beyond a very slight irritation, which some mild ointment relieves.

The number of *r* we have been delivering is greatly in excess of those usually given by American and European workers. Even as late as January of this year Pfahler and Vartine mention that they are giving only 700 to 800 *r*, divided into two doses, through each field. Unfortunately they do not state the type or thickness of the filter used. It seems feasible that if we are capable of giving a much greater dose to the skin, that the growth must receive more, and our results must improve. It is too early yet to make any definite statement on this point. All that can be said is that the tumours do go down much more quickly and that the more resistant tissues, such as secondary epitheliomatous glands of the cervical chain, appear more radio-sensitive. It is noticed, however, that patients contract a more severe temporary anemia than with the smaller dose. At the present time we are collecting a series and attempting to find out to what extent this diminution in blood cells occurs.

Statistics.

Taking the figures for the Commonwealth which have been compiled for this conference, and examining those over the five-year period, the following information is obtained.

1. *Surgery Only*.—Of 140 patients, 36 are alive (25.7%). One hundred and sixteen of these 140 cases were of Stage I or II. Of these 116 patients, 34 are alive (29.3%).

2. *X Rays Alone*.—Of 32 patients, six are alive (18.8%). Only five of these 32 patients were in Stage I or II, and of these five, four are still alive. This would give a five-year rate of 80%, but, of course, the figures are far too small and must be disregarded. Still, if we were to divide the percentage in half it would give a five-year survival rate, in early cases, of 40%. It will take another five years before we can obtain sufficient "X rays alone" figures to be of any value.

3. *X Rays After Surgery*.—Of 121 patients, 47 are still alive (38.8%). Of these 121 patients, no less than 108 were in Stage I or II, and of these 108 patients, 45 have survived for five years, a percentage of 41.6. This does seem to point to post-operative irradiation as being of some definite benefit in cases not later than Stage I or II. With surgery alone we have 116 cases with a survival rate of 29.3%, whereas with surgery and post-operative X radiation there are 108 cases with a survival rate of 41.6%.

Regarding Stages III and IV, from the above figures it can be seen that only two out of 140 patients survived with surgery alone, two with X rays alone, and two with X rays after surgery.

Early diagnosis of cancer still seems to be our main aid to treatment.

No attempt has been made to dissect the cases after June, 1931, as a large number of these are so recent that the results would be of little value. Also no mention is made of the use of X rays before surgery nor of X rays both before and after surgery. The reason for this is that the number of cases before 1931 amounted to only one in each instance.

For all that, it is hoped that in the future surgeons will insist that carcinoma of the breast is irradiated before operation. It must be remembered, and once again this point is stressed, that radiation technique since 1931 has become a definite physiological and biological problem and that since the period at present under review irradiation has achieved probably more than any other branch of medical treatment.

In dealing with all cases of carcinoma or any other disease in which the radiotherapist is consulted, it has not yet been realized that the man who delivers the treatment must have a clinical knowledge of the subject and is not a mere mechanic spending his working hours watching volt and ampere meters. The patient, whilst under treatment, should be entirely placed under his care and should not have any drugs or diet prescribed or other instructions given without the full cognizance and acquiescence of the radiotherapist.

The radiotherapist is a physician or surgeon, whichever way you like to take it, and as such should have full charge of the patient until he or she is returned to the general practitioner or consultant.

Conclusion.

In conclusion, although this address has been written from the deep X ray therapy side as far as the treatment of *carcinoma mammae* is concerned, it is fully realized, as will be shown by others, that surgery, radium and electro-surgery, as well as X rays, all have their proper place in the treatment of this disease. Cooperation and consultation between all concerned appears to be the only way in which the mortality rate can be reduced. Working alone or against one another will not help the patient.

Summary.

1. In cases of true mastitis in young women it is felt that irradiation therapy gives satisfactory results, thus preventing surgical disfigurement.

2. X ray therapy apparently does not destroy the mechanism of lactation when applied to the breast, either before or during pregnancy.

3. A strong plea is put forward for pre-operative irradiation in early *carcinoma mammae*.

4. Much further histological and pathological investigation seems necessary before definite conclusions can be reached as to the action of high voltage X ray therapy on carcinomatous tissue. These results would aid the clinician in determining how far, if at all, X rays should replace surgery.

5. A suggestion is made that if the surgical scar is free from the thoracic wall, the risk of skin recurrences in this region is lessened.

6. The period by statistics in regard to X radiation of mammary carcinoma is not long enough to warrant any conclusions to be drawn therefrom. Also it is to be remembered that the improvement in apparatus and technique precludes any notice being taken of figures later than three years ago.

7. In preparation of statistics a greater amount of notice should be taken of the age of the patient. It is in the young that carcinoma of the breast is most devastating, whilst in the old the possibility of cure is much greater.

8. *Carcinoma mammae* of Stages III and IV do benefit from X ray therapy for some time, at least, and in the aged this relief may persist for some years.

9. The technique given with modern apparatus is described and the different reactions on the skin with high voltages and increased filtration are noted. The large number of r units delivered to each port is stressed, and also the fact that fibrosis of the lung does not occur.

10. Cooperation between the surgeon, the physician and the radiotherapist is the only rational attitude, and consultations between these people should be sought in every case.

References.

- ⁽¹⁾ J. Burton Lee: "Carcinoma of the Breast in the Young", *Archives of Surgery*, Volume XXIII, page 85.
⁽²⁾ George E. Pfahler and Jacob H. Vastine: "Technique and Results of Irradiation in Carcinoma of the Breast: A Review of 1,129 Private Cases", *The American Journal of Roentgenology and Radium Therapy*, January, 1935, page 41.

NOTES ON THE OCCURRENCE AND TREATMENT OF METASTASES IN CARCINOMA OF THE BREAST.¹

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An analysis has been made of all patients with carcinoma of the breast with metastases who have attended the radiotherapeutic centre of the Royal Melbourne Hospital. The object was the determination of the respective times of occurrence of local, glandular, bony and visceral metastases. The great majority of these patients had been treated initially by surgery. Insufficient patients have been treated primarily by radiotherapy to allow of comparative figures concerning such metastases to be presented.

Sixty patients whose condition was originally classed as "operable" had developed metastases, and the average times of appearance of these were:²

- (A) Local recurrence 18.0 months.
 (B) Glandular recurrence 11.4 months.
 (C) Bony secondaries 23.6 months.
 (D) Visceral secondaries 27.0 months.

¹ Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

² A = Local recurrence in and around the situation of the primary growth. B = Glands, including axillary and supraclavicular groups.

Seventy-five cases originally classed as "borderline" revealed the following average times of appearance for their metastases:

Local recurrence	14.0 months.
Glandular recurrence	13.0 months.
Bony secondaries	13.6 months.
Visceral secondaries	24.0 months.

In seventy-five "inoperable" patients, of whom, as would be expected, a greater percentage (roughly one-half) were treated primarily by radiotherapy, the times of appearance of metastases were:

Local recurrence	8.5 months.
Glandular recurrence	8.0 months.
Bony secondaries	12.0 months.
Visceral secondaries	14.0 months.

The last mentioned figures are averages for both surgical and radiotherapeutic cases, but it may be remarked here that local metastases occurred one month earlier, glandular metastases 1.7 months earlier, and bony and visceral metastases five months earlier in "inoperable" patients treated surgically, than when such patients were treated primarily by radiotherapy. The figures in the first two instances are so close that little significance can be attached to them; but it would appear that bony and visceral metastases are relatively delayed in advanced cases if such be treated primarily by radiotherapy.

TABLE I.
Times of Appearance of Metastases.

Site.	Operable.	Borderline.	Inoperable.
	Months.	Months.	Months.
Local recurrence	18.0	14.0	8.5
Glandular recurrence	11.4	13.0	8.0
Bony secondaries	23.6	13.6	12.0
Visceral secondaries	27.0	24.0	14.0

Treatment of Metastases.

The occurrence of a metastasis immediately prompts the clinician to consider whether the condition is worth treating at all. It has been assumed only too often that it is not possible to do anything. Skin nodules have been allowed to ulcerate, gland masses to break down and to fungate, and pain of bony origin to have no better treatment than morphine. There is no reason to believe, as was held by some authorities, that radiation tends to produce carcinomatosis.

The reaction of spinal metastases to deep X ray therapy is often most satisfactory, causing the relief of pain, the disappearance at times of compression manifestations, and improvement in general condition, appetite and weight. Unless the patient's state is very poor indeed it is surprising how much can be done. Many patients are rendered more comfortable, and occasionally one sees a patient who lives for years after the treatment of a seemingly hopeless metastasis.

Before proceeding to the discussion of metastases themselves, a word may be added here concerning post-operative surgical cases which are clinically free of disease. Future events often prove that

many of these patients have malignant cells which have not been removed and which are lying in the region of the scar or in the axilla. One of two things may happen to such cells: (i) They may remain latent for varying periods of time, even ten to eleven years, before springing again into activity. (ii) There is no doubt that in some cases the cells may completely disappear, although it is obvious that this is impossible to prove. If, however, the patient has been treated by radiotherapy, either primarily or following surgical removal, there is a further possibility: the cells may become "embalmed" in dense masses of fibrous tissue, and it can be shown that in such an unfavourable environment they gradually exhibit a less active appearance.

The wisdom of subjecting such patients, with apparently clear surgical scars, to more than one course of deep therapy is therefore apparent.

Supraclavicular Metastases.

A late stage of the disease is usually considered to be present when supraclavicular glands are found to be involved. Adair⁽¹⁾ has demonstrated three types of involvement in this region:

1. The earliest gland to be enlarged is one of the posterior inferior deep cervical group situated deep to the medial head of the sterno-mastoid muscle. The patient's head must be flexed and slightly inclined to the side concerned if this gland is to be detected at an early stage. Drainage occurs from this gland directly into the subclavian duct, so that not anterior mediastinal involvement nor involvement of other cervical glands, but dissemination by the blood stream is to be feared following the observation of its presence.

2. In a second type there is rapid enlargement of a chain of small glands extending up the posterior triangle of the neck to the mastoid process. In such patients diffuse infiltration of the sterno-mastoid muscle may occur with torticollis, and involvement of the cervical plexus may cause severe posterior auricular neuralgia.

3. A rarer type of supraclavicular involvement is found in the patient in whom malignant glands appear superficial to the clavicular origin of the sterno-mastoid muscle. The exact route followed by these cells is uncertain, but it is most likely that they have spread along subcutaneous lymphatic pathways superficial to the clavicle not normally functioning in this direction and indicating in these cases lymphatic obstruction in the outlet of the axilla.

Infiltration around the axillary vein will cause a cyanosed and swollen arm; but the condition of the patient becomes worse when contractive fibrosis follows permeation spread along the perineural lymphatic channels of the brachial plexus, as paresis, usually of ulnar nerve distribution and preceded by very severe pain, unrelieved by morphine, is likely to occur. Radiotherapy is not beneficial in these cases, as it must increase the perineural fibrosis. The injection of various anæsthetizing solutions

may be tried, but Grant⁽²⁾ has advocated high cordotomy of the antero-lateral pathways.

It has been stated that the effect of radium on glandular metastases is not so good as on the primary growth. In some situations this may be so, but in the case of glands secondary to carcinoma of the breast satisfactory response definitely occurs, while in some instances permanent disappearance can be effected.

Good results from Columbia paste collars are rare; nor, after short reflection upon the "law of inverse squares", should they be expected.

The interstitial method of treatment is adopted in Melbourne wherever possible. Radon or radium needles are inserted deep to the cervical fascia, from a point behind the clavicle below to a clinically clear area above. They are passed from before backwards through the deepest fibres of the sterno-mastoid muscle, and other needles are passed from behind forwards to meet them. If the gland mass is too large to be adequately irradiated by a single layer of parallel horizontal needles, in addition, another series of vertical needles should be inserted deep to it. It is wise also to place several needles behind and below the clavicle, piercing the coraco-clavicular fascia.

Supraclavicular or axillary masses do not always completely disappear, for after an initial diminution in size, a hard, tough, somewhat elastic mass of fibrous tissue often remains. These patients sometimes complain of brachial neuritis; this may be due to pressure from the scarred-down glands, or perhaps it is caused by fibrosis following direct perineural malignant infiltration.

The use of radium needles screened with 0.8 millimetre of platinum tends to diminish tissue damage and subsequent scarring, and therefore greatly lessens the likelihood of this complication occurring. But if certain of the posterior inferior deep cervical glands are involved, lying actually over the brachial plexus, active treatment is desirable in spite of the above risk.

The treatment of supraclavicular metastases is thus worth while, although it must be recognized that the ultimate result will depend on: (i) whether the primary growth has been effectively dealt with or is still active; (ii) response of the supraclavicular glands to treatment; (iii) the presence or not of other metastases.

Axillary Metastases and Recurrences.

White⁽³⁾ has demonstrated in tissue removed in radical operations the important fact that microscopic malignant change is present in 50% of cases in which the axillæ were clinically clear. Therefore it is not a rare event to see a patient with an axillary recurrence which has occurred quite a short time after operation for a carcinoma regarded as Stage I of the disease.

Examination of the opposite axilla must never be omitted, as involvement of these glands may occur. This seems an unusual method of spread, but it is really not uncommon.

The glands which lie along the vessels in the lateral wall of the axilla are those usually enlarged in these cases, and it is a surprising fact that the lowest group (brachial) is often involved. Deposits of growth in the opposite breast are also likely to occur in these patients.

Axillary glands respond well to buried needles. The object in view, even in cases with only one gland palpable, should be to irradiate the whole of the axilla—a pyramidal field. Long eight-centimetre needles lie side by side upon the *serratus anterior* muscle, and six-centimetre needles upon the narrower lateral wall. The apex of the axilla is reached by several needles passing through the coraco-clavicular fascia, parallel to, and beneath and below the clavicle. Glands are not individually radiated, as they lie within the limits of the field under attack.

Parasternal Metastases.

Parasternal metastases are usually seen at about the same time that enlarged axillary glands appear, but they occur with more frequency in a medially situated neoplasm. Whereas axillary involvement will not directly cause the death of the patient, parasternal metastases are more dangerous, for inward spread to the pleura and lung is likely soon to follow. The parasternal chain of lymphatic vessels communicates above with anterior inferior deep cervical glands. Thus although supraclavicular and parasternal infection may occur independently, the latter is sometimes secondary to the former.

This emphasizes the desirability of treatment of the supraclavicular region, which may be regarded as the last line of defence.

Treatment of the parasternal secondaries themselves is justified, as the response is good, provided that the bone is not involved. If it is to be assumed that the anterior mediastinum is necessarily affected, the ultimate result will be unaltered, but nevertheless ulceration may be prevented and life prolonged. For this reason, and because intrathoracic spread may not have occurred, parasternal nodules should be treated, the buried needles radiating the whole parasternal area and not merely the one or two nodules present. If excision be the method adopted, it should be equally wide.

The Anterior Mediastinum.

Anatomical considerations prevent a uniform irradiation of the anterior mediastinum with buried needles. The tissue behind each rib and behind the sternum receives an inadequate dosage. On the other hand, the anterior mediastinum may be cleared of its glands and fat surgically. Both methods have proved of no avail in altering the ultimate termination of the disease once this region has been invaded.

Permeation Skin Nodules.

All treatment must be purely palliative if permeation skin nodules are extensive. When only three or four nodules are apparent it must be recognized that the causative lymphatic permeation is present over a very wide area, and treatment should be

carried out accordingly. The response of the nodules to buried radium needles is good. They will disappear, but difficulty lies in deciding how wide an area should be treated.

The permeation is not always adequately dealt with when a field many inches square is treated interstitially. Nevertheless wide treatment gives encouraging results, particularly when the nodules lie close to the surgical scar.

The response to deep therapy is poor when ordinary doses are given; but fractionated larger doses of 2,000 r with a filtration of two millimetres of copper, sufficient to cause a definite early erythema, have caused recession of nodules.

Bony Metastases.

The escape from metastases of the distal bones of the limbs or certain viscera is difficult to explain if one assumes that distribution of carcinomatous cells occurs by the blood stream. The fact that the proximity of a bone to the site of the primary growth increases its liability to become the site of secondary deposits has led to the conception of centrifugal spread from the breast by permeation in the plane of the deep fascia. In this way the periosteal lymphatic vessels may be reached. These communicate with endosteal lymphatic channels in close contact with the marrow, although, of course, the marrow itself has no lymphatics. This explanation is, however, far from being completely satisfactory. Piney⁽⁴⁾ has demonstrated carcinomatous cells in marrow vessels before the appearance of periosteal deposits. He shows that secondary carcinoma develops only in red bone marrow. This persists throughout life only in the proximal ends of the femur and humerus, vertebrae, ribs, sternum and bones of the skull and pelvis, in all of which situations metastases occur. Therefore it is likely that metastasis to bones does occur via the blood stream.

Patients with spinal metastases have severe neuralgic pain of the girdle type, aggravated by movements, and paraplegia frequently follows.

Two types are seen: (i) those in whom many vertebrae and other bones are involved. The more active types of carcinoma are likely to result in this type of spread; (ii) those with local involvement, usually collapse, of a single vertebra.

Deep X ray therapy is often successful in relieving pain, and in most cases bony regeneration is apparent. Immobilization in a plaster bed or jacket is usually advised, but this has the serious disadvantage of causing rapid loss of weight and deterioration in general condition. The persistence of pain will, however, demand immobilization and recumbency.

Pelvic metastases are seen as one or other of two definite types: the osteoclastic and the osteoblastic. The former usually takes the form of irregular "moth-eaten" patches, whereas the latter appears as multiple, rounded, discrete foci of increased density. Growth in the ala of the ilium produces few symptoms until it is advanced. Pains radiating

down the legs or in the hips usually indicate involvement of the pubis or ischium.

When characteristic pain is present, but X ray evidence of secondaries is absent, deep X ray therapy should be given, as pain precedes X ray manifestation of bony metastases, often by months.

Visceral Deposits.

Although at first sight the embolic theory seems necessary to explain visceral deposits, investigation has shown that permeation is probably the true explanation. By this means the subendothelial lymphatic plexuses of the pleura and the peritoneum are reached, and thence the mediastinal and abdominal glands. The serous cavities are soon entered and various viscera invaded from their surfaces.

Little is to be said concerning the treatment of visceral metastases. Patients with pulmonary secondaries should receive a trial course of deep therapy, since an occasional case does respond. Patients with liver involvement die very rapidly, especially when jaundice becomes a complication.

Basis for the Division of Cases of Carcinoma of the Breast into Groups According to the Stage of the Disease.

The following is a basis for division of cases of carcinoma of the breast into groups according to the stage of the disease.

Stage I (operable): Guide: surgical prognosis, good.

Mobile tumour not fixed to the skin or deep fasciae.
Tumour partially fixed but with two inches of apparently healthy peripheral removable skin.
No palpable axillary glands.

Stage II (borderline): Guide: surgical prognosis, moderately good.

Doubt regarding the practicability of complete eradication of primary tumour or secondaries by surgical means, taking into account (i) the size of the tumour and the possibility of adequate local removal with adequate skin margin; (ii) skin or muscular fixation; (iii) glandular deposits, presence of lower axillary glands; (iv) presence of tumour of medial quadrant raising doubt as to the possibility of adequate removal or the presence of mediastinal glands.

Stage III (inoperable): Guide: surgical prognosis, bad.

Size of tumour not allowing the meeting of skin edges.
Local axillary and supraclavicular glands.
Ulceration of the tumour.
Extensive deep fixation to muscle.
Impossibility of complete eradication of tumour extensions by a radical operation.

Summary.

1. A study has been made of the times of appearance of metastases in cases of carcinoma of the breast. It is possible to arrange these into definite class groups.

2. Proper treatment of most metastases is likely to afford the patient considerable relief.

3. Secondary carcinoma in supraclavicular and axillary glands, parasternal metastases, and secondary skin nodules are best treated with buried needles.

4. It is improbable that radiation *per se* causes brachial neuritis. Rather is this due to fibrosis following infiltration along perineural lymphatic channels.

5. Bony metastases frequently manifest their presence by causing pain before they can be demonstrated radiologically. Deep X ray therapy is often successful in relieving pain in these cases.

6. It is usually impossible to benefit patients with visceral metastases.

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THE FOCAL FACTOR IN "RHEUMATISM".¹

By R. GRAHAM BROWN, F.R.A.C.S.,
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RHEUMATISM is a systemic and not a local disease. The joint lesions are the most dramatic but by no means the only manifestations. Until the cause of rheumatism has been determined attempts at prevention cannot be successful and treatment must remain unscientific and somewhat empirical.

The term "rheumatism" has been by far too loosely applied. Some people would insist that acute rheumatism bears no sort of relationship to chronic arthritis. Yet some are convinced that both are the product of infection at different stages of the disease.

By using a mild virulent strain of streptococcus in animals small microscopic lesions have been produced which are similar, if not identical, in appearance to those described by Aschoff in rheumatic subjects (Clawson), that is, subcutaneous nodules *et cetera*, which have been described as the "most rheumatic of all lesions". Aschoff-like bodies have been found in the heart muscles of a large proportion of malignant scarlet fever patients who died too rapidly for any signs of rheumatism to develop. The Aschoff node may turn out to be a peculiar non-pyogenic reaction to the streptococcus which occurs in the tissues of certain people.⁽¹⁾

Bacteriology.

The suggestion is strongly felt by most physicians that the disease in rheumatic children suffering from carditis and pericarditis is the result of infection. *Post mortem* findings confirm this view, but there is still some uncertainty as to the type of the responsible microorganism and the manner of its action. Until recently a non-hæmolytic viridans streptococcus was considered the cause of rheumatism. It had been isolated by various observers from patients' tissues. However, in streptococcal diseases, such as scarlet fever and epidemic tonsillitis, which definitely can produce

¹ Part of a post-graduate lecture delivered in Brisbane on May 28, 1935.

acute rheumatism, the hæmolytic streptococcus is responsible. *Streptococcus viridans* is usually innocuous and is often found in the throats of normal healthy individuals. It can become pathogenic and may cause fatal infections. In some virulent forms of rheumatic infections repeated throat cultures persistently grow the viridans and not the hæmolytic type of streptococcus.

Poynton and Paine, in their classical discoveries made over thirty years ago, showed that the streptococcus was inevitably found closely associated with rheumatism, and even today no other organism can be seriously considered as the cause; some observers believe it to be a specific streptococcus. However, a multiple streptococcal aetiology is possible, the hæmolytic type being the most frequent cause. It is considered as conceivable that the nucleoprotein fraction of the bacteria (part of which is common to all types of streptococci) is the potent bacteriological factor in rheumatism.

The close relationship between acute tonsillitis and acute and subacute rheumatism has been recognized for a long time. This association may be overlooked because the rheumatism, especially in a relapsing case, nearly always follows a streptococcal "sore throat" after a silent period of ten to twenty-one days.

The obtaining of positive results to sedimentation, agglutination and complement fixation tests in individuals after "sore throat" infections usually indicates the onset of rheumatic fever and, on the other hand, suggests recent infection with the streptococcus. Evidence is rapidly mounting up incriminating the streptococcus, but how nasopharyngeal infections manage to light up rheumatism in far-distant areas of the body still remains a problem. It is extremely difficult to demonstrate streptococci in the inflammatory lesions of rheumatism, which is strong evidence against the idea that there is a great escape of living bacteria from the inflamed throat into the general circulation. The most tenable hypothesis is that through previous minor streptococcal infections the tissues of certain patients become hypersensitive to this micro-organism. During subsequent invasion the same organism becomes disintegrated locally in the throat, and the products, mainly nucleoprotein, pass into the circulation and set up violent reactions in the form of rheumatism in remote parts. Rheumatic patients will give much stronger reactions than normal patients following intradermal injections of streptococcal nucleoproteins, especially if hæmolytic streptococcal extract is used. As in other diseases, factors such as atmospheric conditions and overcrowding, improper diet, poor sanitation, and general lack of hygiene, play an important part in the production of rheumatism by causing ill-health. Race and heredity have an influence; for example, children of rheumatic parents often seem to be born with an inherited predisposition to the disease. The outstanding fact in rheumatism of any form is that "focal infection" is most likely the cause of its appearance.

Tonsillectomy.

Wholesale removal of tonsils and adenoids in rheumatic patients is senseless, since pharyngitis occurring in a tonsillectomized child can equally well lead to severe rheumatism, and we must therefore regard the tonsil question as we do when considering other diseases. Remove them if they are causing mechanical obstruction or if they are septic. But if there is a direct association between tonsillitis and rheumatic manifestations, then the tonsils should be removed, no matter how small they may be. This also applies to diseased nasal accessory sinus mucosal linings and dental infections. This point is important and must be remembered when examination of the patient is being made during a quiescent period, when the tonsils may appear small and innocent looking, or the sinus infection may have subsided or a dental infection become quiescent. In this class of case we may look for great benefit by removing these diseased structures. The presence of obvious pus exuding from the tonsil crypts generally means that such a tonsil is not the cause of the rheumatic condition, and the absence of such a sign or the absence of an obvious root infection in a dental X ray film does not exclude septic absorption from these regions. The innocent appearance of tonsils and teeth may lead us to overlook them as the cause. We must not forget that streptococcal infections are generally associated with little local reaction when compared with the reactions to staphylococcal and other infections, and for this reason the slightest indication of infection must be accepted as a definite reason for the radical removal of the parts. Streptococci can invade the bone of the alveolar processes or the bony walls of nasal accessory sinuses^{(2) (3)} without any obvious reaction and be the focus of rheumatic infection, and it must be realized that residual infection in the alveolar processes after teeth extraction is a more common condition than is usually recognized. However, in this group, in the case of the tonsil, one can often see a circumtonsillar congestion or band of injection near the free borders of the pillars of the fauces which may be taken as an indication of absorption of toxins.

Stock vaccines of hæmolytic streptococci have not proved of much use but, if autogenous, they seem to be valuable. Lately a method of intravenous injection of the vaccine has been claimed to produce encouraging results.

Chronic Rheumatism.

Chronic rheumatism may be roughly divided into: arthritis (rheumatoid, chronic polyarthritis, proliferative, infective or atrophic) and arthrosis (osteoarthritis, degenerative or hypertrophic arthritis).^{(1) (4)}

In the "arthritis" group the infective nature is obvious—by fever, increasing loss of weight, leucocytosis, high sedimentation rate of the red blood cells, and frequent discovery of focal sepsis. The involvement of joints is almost always symmetrical, usually being in the extremities, and is accompanied by marked muscular wasting, trophic and circu-

latory changes. The commonest age is from twenty to forty years, with a higher incidence in women.

In the "arthrosis" group the exactly opposite characteristics hold. Signs of focal infection are absent, the nutrition is good, and patients are often over-fat. There is no pyrexia, the blood shows none of the changes seen in the "arthritis" group, and muscular atrophy is not so marked. The large joints are more likely to be affected at first, and the disease is not so generalized. The distribution, however, still tends to be symmetrical. Arthrosis is independent of demonstrable infection and the favourite age of onset is from forty to fifty-five years, which suggests that this form of joint disease is connected with various early indications of old age, such as osteoporosis, arteriosclerosis, endocrine dysfunction, metabolic upsets and dyscrasias. This type of joint infection is more common in men than in women.

Treatment.

Early treatment is essential. Eradication of focal infection is of the greatest importance. Teeth sockets, tonsils, nasal accessory sinuses, urogenital system and alimentary tract should be carefully investigated and dealt with radically if there is a suspicion that they may be the source of the focal infection. The most common site are teeth sockets and the tonsils, but the nasal accessory sinuses not infrequently are the source.

Regarding the tonsils, cultures from the surface are unsatisfactory, as there is invariably a mixed infection there. Cultures may be made from the deepest portions of the crypts by cleaning them out and culturing from the bottom, but this, too, is unsatisfactory. Cultures may be taken from the depths of the tonsils by inserting a needle attached to a syringe through the anterior pillar of the fauces and, when the point is in the depths of the tonsil, withdrawing material into the syringe. Should the tonsils come under suspicion, it is best to enucleate them. Subcapsular cultures can then be made by searing the "capsule" with a red hot instrument and taking cultures from the deepest portions of the crypts.

The Solis-Cohen test consists in growing cultures of the isolated organism in the patient's blood. This test is not accepted as infallible by bacteriologists.

Having found the streptococcus, especially if of the hæmolytic type, but not exclusively, in a rheumatic subject, one can be hopeful of having isolated the causative organism, and removal of the focus may be expected to produce a favourable result, especially if an autogenous vaccine be used in the subsequent treatment. It is, of course, obvious that the removal of a causative focal sepsis will not bring about the disappearance of chronic joint abnormalities. These are permanent, but the disappearance of the painful symptoms is much appreciated by the patient.

The following brief notes of illustrative cases will serve to emphasize the importance of searching for foci of infection and eradicating them.

Miss D.W., aged twenty-six years, was first seen in January, 1922. She suffered from advanced multiple chronic rheumatoid arthritis. Her tonsils were enucleated under local anaesthesia in February, 1925. In March, 1932, expressing her gratitude, she wrote to me, saying: "It was rather marvellous to think that you stopped for me in fifteen minutes' work something that nothing and no one could in the whole of ten years. Thank you again." She has been bedridden for years, but has been free from pain.

Mrs. W.J.T., aged fifty-eight years, was seen in April, 1932. She was a seriously sick woman suffering from advanced multiple chronic rheumatoid arthritis, especially of the knees. The tonsils had been diathermized (by sixteen applications) three years before because she was considered to be too sick then to have enucleation performed. In May, 1932, the large tonsil remains were removed under local anaesthesia and subcapsular cultures were made, which produced *Streptococcus hæmolyticus*, and the result of the Solis-Cohen test was positive. She left hospital five days after operation, feeling and looking very much better. Since this period she has become a "new woman" and has had an operation upon one knee for removal of loose bodies. This woman broadcasts the statement that removal of her tonsils saved her life, besides saving her much agony.

Mr. J.T.C., aged forty-two years, was first seen in February, 1935. He suffered from multiple rheumatoid arthritis, particularly in the neck, knees, right elbow and lumbar spine. His tonsils were enucleated under local anaesthesia, and subcapsular cultures showed *Streptococcus viridans*. The X ray appearances of the antra showed a mottled mucous membrane suggesting a chronic mild sinusitis, and all the sinuses were investigated and cultures were taken from them. The cultures from both antra produced *Streptococcus viridans*. Fourteen days after enucleation of tonsils a double radical antral operation was performed under local anaesthesia. The right sinus was lined by slightly swollen mucous membrane, and the left was almost normal in appearance. This was followed by a course of injections of an autogenous vaccine. Two months later the patient could touch his toes without bending his knees and had improved greatly as regards pain and in all other respects.

Miss C.C., aged forty years, a school teacher, was seen in February, 1935, suffering from advancing osteoarthritis of the lumbar spine. She had been under a leading orthopaedic surgeon, who had sought foci of infection but had not been successful. The tonsils had been removed by me in 1921. The condition was looked upon as hopeless by her medical advisers, but as a last resort she was referred to me for further investigation. The patient had only a little phlegm in the throat, but on X ray examination of the nasal accessory sinuses definite chronic mild mucous membrane changes with some fibrosis were evident in both antra. Cultures were taken from all the sinuses. *Streptococcus viridans* was grown from both antra, the cultures from the other sinuses producing no growth of organism. A double radical antral operation was performed under local anaesthesia. The removed mucous membrane was tougher than normally and showed some slight swelling only in the alveolar recesses. A direct swab was taken from the antra and *Streptococcus viridans* again cultured. The patient was later given a course of injections of an autogenous vaccine. The report received on May 18, three months later, was that the patient was putting on weight (five pounds a fortnight before and two pounds the last week) and she has been back at work for three weeks. The pains in the back are lessening daily, and movements are so much improved that she can now lift her legs to 75° from the horizontal. She still has three dead teeth which need to be extracted.

In conclusion I should like to emphasize again the fact that if a focus of infection can be discovered in patients suffering from rheumatic infections, and if the isolated organism be the *Streptococcus hæmolyticus* or *viridans*, the outlook, so far as stopping

the progress of the disease is concerned, can be considered good. However, this necessitates a very thorough search for the source of the infection, and I should like to suggest that we be not so pessimistic in the future as most of us have been in the past when confronted with patients who are suffering from this dreadful disease, and that we at least give them the benefit of a thorough investigation before condemning them to lifelong misery.

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Reports of Cases.

CEREBRO-SPINAL MENINGITIS DUE TO BACILLUS COLI INFECTION FOLLOWING ABORTION: RECOVERY.

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M.C., AGED twenty-one years, single, was admitted to the Adelaide Hospital on March 18, 1935, with the following history. Six days before admission, being four months pregnant, she had had a miscarriage induced, and two days later her uterus had been curetted. One day before admission to hospital she became feverish and ill and complained of pain and stiffness in the back and neck muscles.

On admission the patient was rather irrational, but answered questions fairly well. Her temperature was 39.4° C. (103° F.); her pulse rate was 120 and her respirations numbered 24 in the minute. There was marked ptosis of the left eyelid, rigidity of the neck muscles and some rigidity of the jaw muscles, so that the patient extruded the tongue with some difficulty. The tongue was coated and foul. Kernig's sign was present. The abdomen was generally tender and rather rigid, but no abnormal dullness or mass was found.

On vaginal examination a very foul profuse discharge was noted. The cervix was patulous and the uterine body was about the size of a two months pregnant uterus; there were no adnexal swellings.

A catheter specimen of urine was clear, contained no albumin or sugar, and was sterile on culture.

Lumbar puncture was done; the cerebro-spinal fluid was under increased pressure, turbid, and contained flakes of lymph. There were 300 cells per cubic millimetre, mainly polymorphonuclear cells, and large numbers of Gram-negative bacilli were present. Culture showed a pure abundant growth of *Bacillus coli*. Blood culture gave no growth after 100 hours; this result was reported on several different occasions. Daily lumbar puncture was performed, and hexamine in 3-6 grammes (sixty grain) doses was given three times a day. The patient did not improve, however, and by the sixth day after admission was dangerously ill. At Dr. West's suggestion, cisternal puncture was performed

with definite relief and improvement in the mental condition, but the patient then complained of loss of vision in the left eye; and ophthalmoscopic examination revealed a detached retina and septic chorioiditis.

Two weeks after admission (April 2) she appeared to be dying; cisternal puncture was discontinued and "Coramine" was given every four hours. Four days later she was much better, the temperature fell by lysis, but as panophthalmitis had supervened in the left eye, the eyeball was excised on April 14. A specimen of cerebro-spinal fluid obtained by lumbar puncture on April 24 was sterile on culture.

The patient has completely recovered and is now normal mentally and physically, except for the loss of the left eye. The pathologist's final report on the bacillus found in the cerebro-spinal fluid was as follows: "This organism is of the *Bacillus coli* group, but not *communis*. It does not ferment saccharose, is non-mobile and non-hæmolytic. It resembles the *Bacillus coli neapolitanis*."

This case is considered worth reporting because of:

1. Its extreme rarity; we have been unable to discover any similar case reported.¹
2. The fact that *Bacillus coli* was persistently present in the cerebro-spinal fluid for four weeks and that repeated blood cultures were always sterile.
3. The fact of recovery.

Reviews.

PATHOLOGY FOR NURSES.

DESCRIBED as being for the use of nurses, a revised second edition of "Microbiology and Elemental Pathology" has been produced by Dr. Charles Sinclair.² The subject matter is divided into three parts, bacteriology, laboratory exercises in microbiology and elements of pathology. More than half of the book concerns bacteriology.

In a fairly general introduction to the discussion on organisms the author explains many terms and deals with types, occurrence, sterilization *et cetera* in language that can be easily followed and understood. Much of the information in this section would be helpful to nurses in their general work. Then in turn the commoner organisms are described, illustrations being freely used. Some of the subheadings are: "Occurrence", "Laboratory Identification", "Significance to Physician", "Significance to Nurse". One feels, however, that some of the laboratory details and descriptions could have been eliminated and more space, at least in places, could have been devoted to influence and effect on nursing practice and methods. The chapters on immunity are more in keeping with the character of the work, and useful definitions and descriptions are given on a subject about which nurses often appear confused.

In Part II, on laboratory exercises, the author gives simple methods in technique which generally would not be of much use to the average nurse and which would be insufficient for any practical work in a laboratory.

A very brief account of many diverse pathological subjects, as inflammation, tumours, parasites, with many definitions, occupies the third part on elemental pathology. Some simple tests, as gastric analysis, blood counts, are mentioned. In the attempt to cover this large field in a hundred or so pages the style becomes rather disjointed and the reading somewhat difficult.

Generally some parts of the book would not appeal to the average nurse and would hardly be needed in general training, but it would be advantageous for a copy to be at hand on the ward sisters table or in the nurses' library. Lecturers to nurses would find the book very useful.

¹ In *The American Journal of the Medical Sciences*, Volume CLXXII, page 740, Dr. Josephine Neal, in a survey of 1,500 cases of meningitis, reports seven cases due to *Bacillus coli*, but these are all in children and, of course, not due to septic abortion.

² "Microbiology and Elementary Pathology for the Use of Nurses", by C. G. Sinclair, B.S., M.D.; Second Edition; 1934. Philadelphia: F. A. Davis Company. Demy 8vo., pp. 377, with illustrations. Price: \$2.75 net.

The Medical Journal of Australia

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THE ETIOLOGY OF ACUTE RHEUMATISM.

FOR many years acute rheumatism has been looked upon as of microbic origin and the streptococcus has been almost invariably incriminated. In 1897 Triboulet and Coyon reported that they had isolated cocci from the blood of persons suffering from rheumatic fever; and in 1899 Westphal, Wassermann and Malakoff isolated streptococci after death in a case of chorea. It was, however, the work of Poynton and Paine reported in Great Britain in 1900 that first directed serious attention to the streptococci as the cause of acute rheumatism. The history of the work which followed that of Poynton and Paine is full of interest—different strains of the streptococcal organism were isolated by different workers; one confirmed the work of another and others disagreed. Although many have conceded to the streptococcus an important share in the causation of acute rheumatism, several eminent bacteriologists have been unable to agree with this view. Phillip, Cole, Horder, Schürer and de Vecchi all in turn failed to isolate streptococci from the blood and from joint fluid during life. Bulloch and Thompson were unable to find any bacteria by cultivation or by histological examination in blood,

heart valves, joint fluid or subcutaneous nodules. As long ago as 1912 de Vecchi sought to show that a virus was the cause of acute rheumatism; others have worked along the same lines, but the virus hypothesis is as yet unproved.

An important piece of research has recently been carried out in England by B. Schlesinger, A. G. Signy, C. R. Amies and J. E. Barnard, and reported in *The Lancet* of May 18, 1935. They have produced experimental evidence in favour of the virus hypothesis that must be seriously considered. In order to obtain a concentration of the causative agent they submitted rheumatic exudates or suspensions of tissues to high speed centrifugation. They point out that the high speed centrifuge has been used successfully in the study of such virus diseases as vaccinia, psittacosis, trachoma, varicella and zoster. They assumed that the most active and extensive inflammatory lesions would contain the causal agent in greatest amount. Fluid was taken from the pericardium in seven cases within twelve hours of death. After the careful use of a technique that need not be described, minute bodies of uniform size and characteristic appearance were found in six of the seven specimens; the specimen of fluid which contained none of these bodies was obtained from the most chronic of the seven cases. From a control series no similar bodies were obtained. Bodies similar to those found in the pericardial fluid were found in a specimen of pleural exudate occurring in association with rheumatic pneumonia. Photomicrographs of the bodies prepared by J. E. Barnard are published, together with his description of them. The authors realize that the utmost caution must be used in interpreting the results of microscopic examinations of this kind; they rely, however, for their conclusions chiefly on the results of agglutination experiments. Suspensions of the particles in formol saline solution were prepared. It was found that the suspensions were specifically agglutinated by the serum of patients suffering from or successfully resisting an acute rheumatic infection. The serum of patients in whom the infection was quiescent failed as a rule to agglutinate the suspensions. No agglutination occurred with the serum of normal persons and of patients suffering

from various non-rheumatic infections. These authors suggest that the bodies found by them represent the actual infective agent of acute rheumatism. At the same time they admit that the final proof must rest upon the demonstration that these bodies are capable of reproducing the disease in a susceptible animal.

The careful critic will accept the work of Schlesinger and his co-workers as suggestive and nothing more. These investigators have applied to acute rheumatism the methods of investigation that have been used with success in connexion with other diseases; they may yet be able to show that de Vecchi was right in his original contention. But if a virus is found to be the actual causative agent of acute rheumatism, what of the streptococcus? The streptococcus cannot be excluded from the picture. Is its influence co-evil and co-active with that of the virus, or does it flourish in soil prepared by the virus? It is possible to imagine many relative differences of virus-streptococcus activity that would explain quite a number of the obscure phenomena of rheumatic disease. Speculation of this sort, however, will lead nowhere. Schlesinger and his fellow workers are to be congratulated on their important investigations; they will, it is to be hoped, pursue their investigations further.

Current Comment.

ACUTE RHEUMATISM IN THE ELDERLY.

It was once believed that rheumatic fever was a disease that only attacked the young. In fact the occurrence of a suspicious illness in a middle-aged or elderly patient even now invites scepticism as to the possibility of a true acute rheumatism being the cause. Eugene B. Ferris and Walter K. Myers have brought forward evidence that this disease can and does attack persons after middle life, and assert that within the past few years initial attacks of rheumatic fever have been observed in the Boston City Hospital with surprising frequency in patients after middle life.¹ Of course the question of proof must be settled, but in Ferris's and Myers's article evidence is presented in a small but well observed series with autopsy findings. Six elderly patients have been studied; three died. The clinical diagnosis rested upon the presence of polyarthritides, an active cardiac involvement, such as endocarditis, pericar-

ditis, and fluctuating disturbances of the conduction system, and in general an illness the course of which was consistent with the known characters of rheumatic fever. A typical case history was that of a woman of seventy-nine years, who had complained of fleeting joint pains for six months, but had no previous history of rheumatism or chorea. Swelling, pain and tenderness were present in one hand and both wrists, and to a less extent in the ankles and one shoulder. The temperature was moderately raised and the pulse was rapid. A medium-pitched systolic murmur was heard at the mitral area, there were many premature beats and a gallop rhythm was detected. Examination of the blood showed a slight secondary anaemia and a moderate leucocytosis. Electrocardiographic study showed a prolongation of the conduction time in the heart. After a brief illness the patient died, apparently from cardiac failure, and autopsy revealed only some pleural and peritoneal adhesions, with chronic cholecystitis and slight arteriosclerotic changes; apart from the congestive changes incident upon a death from cardiac failure, no other gross macroscopic change was found. But histological examination of the heart demonstrated numerous typical Aschoff bodies in the cardiac muscle; these were well formed, and there could be found no old rheumatic lesions. In this case it seemed credible that the patient died from acute rheumatism, but her great age seemed to invalidate this diagnosis. However, the observation of other similar cases supported the idea, and the account given of the illnesses of similar patients points to the probable correctness of the diagnosis. In one case a sixty-two year old man had been under medical observation for one year, during which time he had suffered from joint pain and swellings, and his medical attendant had noted the development of mitral stenosis, not previously existing.

In each of the cases quoted by Ferris and Myers it would certainly appear that elderly patients had suffered an initial attack of acute rheumatic fever. The authors are careful to discount the importance of electrocardiographic evidence in these old patients, and, indeed, this is a criticism which occurs to the reader at once, for it would be expected that at an advanced or, indeed, any considerable age vascular degenerative changes occur in the heart, and prolongation of the conduction time is not to be looked on as an unusual finding. But apart from this the evidence is strong. As one might expect, the joint manifestations were more prolonged than in younger persons, though somewhat less intense. That the heart was just as susceptible is not surprising, and in the three patients who survived there were evidences of active carditis for six months. Ferris and Myers actually state that of persons admitted to the medical services with rheumatic fever during the past five years 45% were over the age of thirty years. Only patients over twelve years are included in this series, and if these figures are well authenticated they are all the more striking, for they refer only to those thought to be suffering from their first attack, and in all cases were there evidences of active carditis. These

¹ *Archives of Internal Medicine*, May, 1935.

authors conclude by stating that though the incidence of rheumatic fever is undoubtedly low in persons after middle age, it is sufficiently common to be worth thinking of in all cases of polyarthritis. It is of interest to observe that if the recent work on virus infection as the underlying infective lesion in rheumatic fever, described in the leading article in this issue, is sustained, more accurate diagnosis may be possible, and the true incidence of this most important disease may be worked out with greater accuracy. It may be pointed out also that cases are not infrequently seen in which the onset of a cardiac failure is mysterious, and best explained by the presence of some hypothetical infection, which one hesitates to call rheumatic on account of the age of the patient and the lack of other convincing evidence. It is possible after all that acute rheumatic carditis is more prone to attack those in the later decades than we have thought.

THE USE OF PURGATIVES.

Now and then it is well for the would-be scientific and progressive practitioner to turn his gaze from the rare and abstruse to the common; in other words, the most earnest of us may become "low-brow" at times with advantage. Thus it may happen that the opportunity will arise to give advice on the simple subject of evacuation of the bowel, and it should be to the advantage of the patient to receive advice based upon adequate knowledge, rather than to buy the most attractively advertised aperient preparation from the pharmacist, or, perhaps more frequently, from the nearest branch of a chain-stores firm. V. E. Henderson writes a short but useful article on the subject of purgatives.¹ He begins by saying that there is probably no more common cause of minor ill-health than constipation; all would not agree with this statement, perhaps, but none could deny that it is highly advisable that all people should seek the regulate the function of the colon as nature designed.

The commonest cause of constipation, as Henderson points out, is the gradual blunting of the perception of the normal sensory stimuli from the lower bowel. We soon fail to notice the pressure of clothes, footwear *et cetera*, and, like the dogs in Pavlov's experiments, we can soon learn to neglect stimuli that once excited us. There can be no doubt that the unpunctual owner of a sluggish colon can actually reeducate himself and his viscera if he will but take the trouble, for good habits, like bad ones, are learnt early. Since it is hopeless to expect that a mere theoretic disapproval will wipe out aperients from the pharmacopœia, it is well to know their several properties. Henderson remarks that there is now no reason why drugs like gamboge, euonymus, leptandrin should ever be used, nor even the more defensible jalap, podophyllin and colocynth. Some of these are still employed, especially the last named, in spite of its definitely irritating effect on the small

intestine. Saline purgatives and castor oil, we agree, have their sphere of usefulness, and the former are relatively harmless for repeated administration if such be necessary. A few interesting remarks are made, however, about strychnine, which is included in a number of proprietary pills. Henderson states that, in spite of the almost total absence of any experimental proof that this drug is of the slightest use in an aperient medicine, it is a constituent of no less than eleven pills or tablets sold by one Canadian firm alone. Deaths have occurred in children who have swallowed numbers of attractive chocolate-coated pills containing strychnine; this needs no further comment. Liquid paraffin is also the subject of some critical comment, the author deriding the claim that it acts as a lubricant, seeing that intestinal mucus is already a most efficient lubricant; he considers that the oil acts by preventing the absorption of water. However, the accuracy of the argument will not trouble the manufacturer much, provided it will sell the goods. Agar with paraffin no doubt has something to commend it, but it is truly pointed out that the vendors of these mixtures do not trust to such neutral substances alone, but combine them with phenolphthalein, which is a slightly irritant drug, and thus insures the efficacy of the "lubricant".

The author concludes his brief survey with the advice that the patient should not be turned over to the proprietary medicine vendor, for he may easily become the prey of the advertising agent. It is best that an official preparation should be used if possible, but at least the prescriber should confine himself to those compounds that his experience has proved to be harmless and reliable. Above all, treatment of constipation should aim at the reestablishment of the normal colonic reflex. Henderson suggests as a possible method the employment of a saline at first, the evening pill having been discontinued. This is designed to favour stimulation of the colon after the morning meal, which is the optimum time. This may be followed by the use of prunes, figs and other similar laxatives, combined, if necessary, with paraffin and agar or some "roughage", though the latter is no doubt much less useful than is popularly supposed. Such simple means may prove effective in mild cases of constipation, but the most important point is the necessity for the assiduous cultivation of correct habits and the learning to heed the all too commonly suppressed sensations from the lower part of the alimentary tract. If a collection could be made of all aperient drugs sold to the general public, it would without doubt make a most interesting exhibit. Perhaps the influence of the medical profession can help to suppress some of these, that should be on an Index Expurgatorius, not a semi-official Index Purgatorius, as at present. All medical practitioners know that it is much easier to sell the public anything in a bottle than to teach them good habits, but if we take no interest in finding and proclaiming the truth we shall continue to fight a losing battle.

¹ The Canadian Medical Association Journal, May, 1935.

Abstracts from Current Medical Literature.

MORBID ANATOMY.

Skeletal Lipoid Granulomatosis (Hand-Schüller-Christian's Disease).

JOHN FRASER (*The British Journal of Surgery*, April, 1935), in a paper on Hand-Schüller-Christian's disease, devotes particular attention to the skeletal changes. In view of the prominence of the bony changes he calls the condition skeletal lipoid granulomatosis. He points out that certain disorders of lipid metabolism are classified into five groups according to differences in the biochemical agencies which appear to initiate disease, the type of tissue affected, and the reaction which these tissues display, the prognosis, and the response to therapeutic measures. The five varieties are: (i) Gaucher's syndrome, in which a lipo-protein of the cerebroside type initiates a morbid anatomy; (ii) Niemann-Pick's syndrome, associated with a phosphatid lipid deposit; (iii) Tay-Sach's syndrome, probably attributable to a cerebroside protein derangement; (iv) Hand-Schüller-Christian's syndrome, in which an error in cholesterol metabolism appears to be responsible; (v) a somewhat heterogeneous group, including xanthoma, xanthomyeloma, xanthelasma, conditions attributable to degrees of cholesterolemia. The author gives histories of four cases of the Hand-Schüller-Christian syndrome and points out that in all there were deposits, chiefly in the membrane bones, of such a nature as to be mistaken for malignant tumour formation and illustrating a pathological change which, while it bears resemblance to primary tumour formation, appears to have its explanation in a stimulus of reticulo-endothelial tissues by a chemical substance of lipid character. The author discusses in some detail the reticulo-endothelial tissues, the cholesterol lipid and hypercholesterolemia. He states that in attempting to offer an explanation of the process that results in the deposit of localized collections of cholesterol so as to constitute the clinical condition of lipoid granulomatosis (he prefers this name) there must be a considerable element of hypothesis. He suggests that the initial change is one of increased lipid (cholesterol) content in the circulating body fluids. He sees reason to suppose that this change originates in some change, possibly prenatal, occurring in the areas which control lipid metabolism. As a result of the lipid increase, and in an attempt to adjust the balance, the reticulo-endothelial tissues of certain body areas proceed to concern themselves with absorbing and depositing the substance so that accumulation occurs in individual areas. This phase is not accomplished without consider-

able cell reaction among the tissues concerned, and the ensuing changes may be said to constitute the characteristic lesion.

Hæmorrhagic Encephalitis.

A. B. BAKER (*The American Journal of Pathology*, March, 1935) has reported twenty cases of a condition that he describes as hæmorrhagic encephalitis. Clinically the condition gives rise to a picture typical of acute encephalitis. Death ensues in from a few hours to several days after the onset of the illness. Pathologically the most striking lesion is a hæmorrhagic involvement of the brain. The hæmorrhages occur chiefly in the white matter. They vary widely in number and size, from extensive extravasations which destroy much brain tissue to tiny perivascular bleedings. In the brains of patients who survive the first few days there are often observed areas of non-hæmorrhagic perivascular demyelination which are invaded by scavenger cells. Consistent specific changes in the ganglion cells were not observed. Occasionally a blood vessel showed a slight perivascular infiltration of mononuclear cells. A few widely scattered polymorphonuclear cells could be detected in the areas of degeneration. *Post mortem* study showed that all the organs except the brain were normal. The author states that the hæmorrhages found in other diseases can by careful clinical and pathological study be easily differentiated from true hæmorrhagic encephalitis. He makes a preliminary report on experimental observations undertaken with fresh brain tissue from a case of hæmorrhagic encephalitis. This tissue proved virulent to rabbits on intracerebral inoculation. A detailed description of these studies will be given in a later communication. On the basis of his present study the author accepts hæmorrhagic encephalitis as a clinical entity.

Endocardial Tuberculosis.

R. D. BAKER (*Archives of Pathology*, May, 1935) has attempted to answer certain questions in regard to the involvement of the endocardium by tuberculosis. He gives details of the findings in seven cases examined *post mortem*, and has also studied autopsy records, museum specimens and the literature. He points out that endocardial tuberculosis encountered at autopsy is most frequently part of a generalized or disseminated tuberculosis. Scattered tubercles varying from microscopic size to a diameter of three or four millimetres may occur in any part of the endocardium, including the valves. They probably arise by implantation, through the coronary arteries and directly from the blood of the heart. Rarely they may be polypoid or pedunculated. Endocardial tuberculosis may also develop from the extension inward of pericardial and myocardial caseous masses which may ulcerate and produce generalized tuberculosis. When

staining for elastic tissue is used, it can be shown that a myocardial tuberculous process bulging into the cavity of the heart, but apparently covered with a smooth endocardial surface, is in some cases really invading the endocardium. Though in the literature there has been recorded one instance of tuberculous endocarditis as a diffuse process at the line of closure of the valves, somewhat analogous to rheumatic and pyogenic endocarditis, tuberculosis in general has no especial affinity for the line of closure and does not produce thrombotic vegetations. Endocardial tuberculosis may interfere with cardiac function in the rare instances in which caseous nodules involve the valves. The author found that sclerosis of the endocardium and healed fibrous or calcified valvular lesions noted at autopsy were due to the toxic action of a tuberculous process elsewhere in the body.

Enchondromata and Dyschondroplasia.

J. K. MUNRO (*The Lancet*, April 13, 1935) reports in detail with skiagrams the history of a man, aged twenty-three years, who suffered from masses of enchondromata of the hands and feet and from dyschondroplasia of other bones. He points out that Ollier described a condition of dyschondroplasia and contrasted it with the condition of multiple chondromata. Ollier described dyschondroplasia as "an affection characterized by irregularity in development, evolution and distribution of cartilaginous tissue in the bones in process of development, the cartilage seeming to be of normal structure and changing more or less slowly in the direction of ossification". The author states that multiple chondromata arise during the period of growth, but that the neoplastic tumours remain indefinitely in a cartilaginous state, making no attempt at ossification. He regards the case reported by him as a link between the conditions contrasted by Ollier.

Bilateral Carcinoma of the Breast.

O. N. MELAND (*The American Journal of Cancer*, May, 1935) reports two cases of bilateral carcinoma of the breast. The author believes that the first was a case of true bilateral carcinoma. In this instance both breasts were removed; one was found to be the site of a mucoid carcinoma, and the other of an adenocarcinoma. The second case, in the author's opinion, represents a case of carcinoma of multicentric simultaneous origin, though the histological appearance of the growth in the two breasts was similar.

Meningococcal Meningitis following a Fracture of the Skull.

B. G. MAEGRAITH (*The Lancet*, April 13, 1935) reports a case of meningococcal meningitis that followed a fracture of the skull. The patient was a man who was admitted to hospital after a motor car accident.

A fracture of the skull was seen extending backwards in the frontal bone from the bridge of the nose. Twelve days after his admission to hospital the patient became febrile and lumbar puncture was performed. A meningococcus was grown from the cerebro-spinal fluid. The patient died. The author points out that there was no evidence to show how the infection occurred, but states that probably the patient was a carrier of Group II meningococci, which entered the cranial cavity either directly through a fissure in the base of the skull or through the blood stream. No swabs of the naso-pharynx were obtained.

MORPHOLOGY.

Experimental Innervation of Muscles by the Central Ends of Afferent Nerves.

PAUL WEISS (*Journal of Comparative Neurology*, February, 1935) describes the experimental establishment of a one-neurone connexion between the receptor and effector organ in the frog. The central end of the ninth or tenth dorsal root was disconnected from the spinal cord and inserted instead into a denervated muscle which had previously been transplanted to the back. In this way a direct connexion between peripheral sense organs and muscle fibres has been achieved by a single neurone ("mono-neural" connexion), eliminating the central nervous system as intermediary between receptor and effector organs. The connexion between the muscle and its nerve supply was examined both physiologically and histologically. In a number of cases, though not in all of them, the dorsal root fibres formed functional connexions with the muscle fibres. This confirms the view that in the formation of nervous connexions with the peripheral organs no strict selectivity exists. In successful cases electrical stimulation of the sensory nerve yielded prompt and vigorous contractions of the muscle connected with the central end. In sharp contrast to the positive effect of electrically evoked excitations, the adequate sensory excitations evoked by mechanical stimulation of the sense organs failed consistently to contract the muscles.

Erythrocyte Production in the Bone Marrow.

H. E. JORDAN AND E. P. JOHNSON (*American Journal of Anatomy*, January, 1935) state that recently Doan, Cunningham and Sabin advanced the novel concept that the avian and mammalian erythrocyte takes its origin in the bone marrow of the adult from a specific cell, the so-called megaloblast, an intravascular derivative of the endothelium of alleged intersinusoidal capillaries. The present authors claim that the

so-called intersinusoidal capillaries are actually intercellular stromal spaces open to the venous sinusoids and bordered by reticulum cells. Their experiments consisted of depleting the radius of the pigeon by Doan's method of underfeeding. The average period of fasting was ten days. Regeneration in the experimental aplastic gelatinous marrow was stimulated by return to normal feeding. Restoration of erythrocytogenesis was found to have three chief aspects: (i) proliferation of persistent hemocytoblasts in the peripheral sinusoids and their transportation to deeper venous channels, and concomitant differentiation into erythroblasts in regions of relative blood stasis at all levels; (ii) proliferation of the stromal cells in the subendosteal area, their differentiation into hemocytoblasts, which may migrate into adjacent sinusoids, where they develop into erythroblasts; (iii) production by relatively intense proliferation in subendosteal regions of lymphoid nodules consisting of small lymphocyte-like cells which migrate into deeper regions via interlipocellular stromal spaces and capillaries, meanwhile in part differentiating into typical hemocytoblasts (myeloblasts), which enter into adjacent sinusoids to develop into erythroblasts. Extravascular hemocytoblasts, in all respects like those which differentiate into erythroblasts within the sinusoids, differentiate into granulocytes. There is no justification on morphological grounds for an interpretation of the reticulum cells (histiocytes) of the stromal spaces, as endothelium. The endothelium of the sinusoids and venous capillaries is inert as regards erythrocytogenesis.

The Constitution of the Sheath of the Rectus Abdominis Muscle.

K. S. CHOUKE (*Anatomical Record*, February, 1935), in a series of special dissections of the anterior abdominal wall on 136 cadavers, found that in the majority of cases the middle part of the internal oblique muscle was found to split into two parts, from its origin from the iliac crest to the *linea semilunaris*. He suggests a new name for the posterior split portion of this muscle, namely, *musculus obliquus abdominis internus accessorius*. This accessory muscle, when present, is separated from the internal oblique muscle by a branch of the ilio-hypogastric nerve, a branch of the deep circumflex iliac vessels and one or two distinct layers of fascia. The lower border of the accessory muscle is in line with the *linea semicircularis*. When the *linea semicircularis* is missing, a thinner posterior lamella of the internal oblique aponeurosis is found in the lower posterior part of the rectus sheath.

Basophile (Mast) Cells in the Subcutaneous Tissue of the Albino Rat.

E. O. BATES (*Anatomical Record*, January, 1935) states that mast cells are not merely cells of adult life,

but they occur very early in the development of the individual, and that they cannot be of a degenerative nature. He finds that the mast cells are not associated with any particular body region of areolar connective tissue, neither are they in any way associated with lymphocytes. He also finds no evidence to support the idea that mast cells are either abortive or immature eosinophile cells. Mast cells were found to be derived from very small cells of about the size of a human erythrocyte and then go through a definite growth to large cells with more numerous granules, so that it appears that the theory that mast cells are progressively derived from other distinct cell types appears to be untenable. All observations point to the fact that the mast cell is a distinct type of cell formed from the fixed connective tissue cell and does not owe its existence to degenerative processes occurring in other cells.

Biological Effects of Röntgen Rays.

T. T. JOB, G. J. LIEBOLD AND H. A. FITZMAURICE (*American Journal of Anatomy*, January, 1935) demonstrate critical periods in the development of a mammal (albino rat). With proper doses of X rays administered on the ninth day of gestation, a hydrocephalic condition can be produced in the young. Likewise, on the tenth day defective eye development can be obtained, and on the eleventh defective jaw development. The period in development and the dose of X rays are relatively specific and definitely related. Doses of X rays sufficient to kill all fetuses of a litter may be administered as late as the eighteenth day of gestation without causing abortion. Males *in utero* are definitely more susceptible to X rays than females. The jaw defect, however, seems to be an exception. Certain doses of X rays apparently exert a sex differentiating influence when administered during the ninth, tenth and eleventh days of gestation.

Stimulation of the Hypothalamus.

S. W. RANSON, H. KABAT AND H. W. MAGOUN (*Archives of Neurology and Psychiatry*, March, 1935) state that stimulation of the grey matter surrounding the anterior commissure not far from the mid-line, or stimulation of the adjacent portion of the septum inhibits respiration and causes contraction of the bladder and sometimes a drop in blood pressure. Stimulation of the hypothalamus causes an increase in the rate and depth of respiration, an increase in the blood pressure, inhibition of gastro-intestinal peristalsis and dilatation of the pupils, as well as contraction of the bladder.

Infra-Red Photography in Anatomy.

L. C. MASSOFUST (*Anatomical Record*, December, 1934) illustrates how infra-red photography amplifies existing methods by permitting photographs to be obtained with transmitted light in cases in which visible light does not penetrate.

British Medical Association News.

ANNUAL MEETING.

THE ANNUAL MEETING OF THE SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held in the Prince of Wales Lecture Theatre, University of Adelaide, on June 26, 1935, Dr. F. St. J. Poole, the Acting President, in the chair.

Annual Report of Council.

The annual report of the Council was received. In moving its adoption, Dr. A. V. Benson congratulated the Council on its efforts for the control of tuberculosis in South Australia and for its efforts to enable medical practitioners to obtain payment for the emergency treatment of patients injured in motor accidents. The motion was seconded by Dr. J. Riddell, who drew attention to some anomalies in regard to the receipt of medicine by people who were receiving rations from the State. He thought that the Council might pay attention to this question. The motion for the adoption of the report was carried. The report is as follows:

Election.

At the annual meeting held last June the following were elected:

President: Leonard C. E. Lindon.
Vice-President: D. R. W. Cowan.
Honorary Medical Secretary: Alan H. Lendon.
Honorary Treasurer: F. St. John Poole.
Ordinary Members of the Council: R. A. Haste, A. F. Hobbs, R. D. Hornabrook, L. A. Wilson.

At the first meeting of the Council held on July 5, 1934, the following subcommittees were appointed:

Scientific: President, G. H. Burnell, D. R. W. Cowan, A. R. Clayton, R. A. Haste, R. D. Hornabrook (Honorary Secretary, convenor).
Contract Practice: D. R. W. Cowan, R. A. Haste, A. F. Hobbs (Lay Secretary, convenor).
Library: Sir Henry Newland, G. H. Burnell, L. A. Wilson (Honorary Secretary, convenor).
Parliamentary Bills: President, D. R. W. Cowan, E. Britten Jones, F. St. John Poole (Lay Secretary, convenor).
Revision of Rules: Sir Henry Newland, Bronte Smeaton (Lay Secretary, convenor).
Ethical: President, Sir Henry Newland, G. H. Burnell, D. R. W. Cowan, E. Britten Jones, Alan H. Lendon, F. St. John Poole, Bronte Smeaton, L. A. Wilson (Honorary Secretary, convenor).
Hospital Policy: G. H. Burnell, D. R. W. Cowan, A. F. Hobbs (Lay Secretary, convenor).

Meetings.

The Council.—The Council has met on thirteen occasions, the attendance being:

G. H. Burnell	12	Alan H. Lendon	13
A. R. Clayton	10	L. C. E. Lindon	10
D. R. W. Cowan	10	Sir Henry Newland ..	10
R. A. Haste	12	F. St. John Poole ..	12
A. F. Hobbs	11	Bronte Smeaton	13
R. D. Hornabrook ..	12	L. A. Wilson	10
E. Britten Jones ..	7		

Scientific Subcommittee.—The Scientific Subcommittee met once, the attendance being:

G. H. Burnell	1	R. D. Hornabrook ..	1
D. R. W. Cowan	1	Alan H. Lendon	1
A. R. Clayton	1	L. C. E. Lindon	1
R. A. Haste	1		

Contract Practice Subcommittee.—The Contract Practice Subcommittee met on ten occasions, the attendance being:

D. R. W. Cowan	9	A. F. Hobbs	9
R. A. Haste	9		

Library Subcommittee.—The Library Subcommittee met once, the attendance being:

G. H. Burnell	1	Sir Henry Newland ..	1
Alan H. Lendon	1	L. A. Wilson	1

Parliamentary Bills Subcommittee.—The Parliamentary Bills Subcommittee met once, the attendance being:

D. R. W. Cowan	1	L. C. E. Lindon	1
E. Britten Jones	1	F. St. John Poole ..	1

Ethical Subcommittee.—The Ethical Subcommittee met on four occasions, the attendance being:

G. H. Burnell	3	E. Britten Jones	1
D. R. W. Cowan	3	L. C. E. Lindon	3
Alan H. Lendon	3	F. St. John Poole ..	4
Sir Henry Newland ..	2	Bronte Smeaton	4
L. A. Wilson	4		

Monthly General.—Eight meetings were held, the interest and attendance being well maintained. The September meeting was held at Gawler, when a representative number of members attended.

The following programme was carried out during the year:

1934.

July 26.—Paper by Gilbert Brown: "Spinal Anæsthesia". (Discussion opened by A. F. Hobbs.)
 August 30.—Paper by F. N. Le Messurier: "Chronic Intestinal Toxæmia in Children". (Discussion opened by F. H. Beare.)
 September 29.—Paper by R. E. Magarey: "The Treatment of Pelvic Sepsis, Puerperal and Post-Abortional". (Discussion opened by H. M. Fisher and Roland Beard.)
 October 25.—Paper by A. Grenfell Price: "White Settlement in the Tropics". (Discussion opened by Frank S. Hone and J. B. Cleland.)
 November 29.—Paper by S. R. Burston: "The Modern Treatment of Diabetes". (Discussion opened by W. Ray.)

1935.

March 28.—Paper by H. J. Wilkinson: "Some Aspects of the Autonomic Nervous System". (Discussion opened by F. H. Beare.)
 April 24.—Paper by A. R. Southwood: "Medical Aspects of Pyelitis". (Discussion opened by I. B. Jose.)
 May 30.—Listerian Oration—Professor W. A. Osborne: "Lister as a Great Experimental Physiologist".

Listerian Oration.

The Oration this year was delivered by Professor W. A. Osborne, of Melbourne, on May 30, his subject being: "Lister as a Great Experimental Physiologist". There was a good attendance of members at the Oration, and the Council desires to thank Professor Osborne.

At the close of the meeting the President invited members to supper.

Membership.

The membership of the Branch is 359. The number of new members elected was 7. It is with deep regret that we record the death of the following members: E. A. Brummitt, M. W. Sprod.

Representation on Boards.

Dental Board: P. T. S. Meesset.
Nurses' Board: S. R. Burston.
Medical Board: H. H. E. Russell.
Metropolitan Infectious Diseases Hospital Board: H. H. E. Russell and P. T. S. Cherry.

Work of Sections.

Eye, Ear, Nose and Throat Section.—Eight meetings were held during the year, the attendance being satisfactory. There are 14 members in this section.

Anæsthetics.—Five meetings of this section were held at the Adelaide Hospital.

Clinical Medicine.—This section has a membership of 72, an increase of two during the year. Five meetings were held, the average attendance being 26. The balance sheet shows a satisfactory state of affairs.

Surgery.—This section held four meetings, the average attendance being 19. The membership has increased from 30 to 35 members during the year.

Lodge Practice.

No alteration has taken place during the year in the conditions of lodge practice, although efforts were made by the United Friendly Societies Council to secure a reduction in the medical fee. The friendly societies were informed that the Council of the Association was not prepared to reduce the medical fee. The Eye, Ear, Nose and Throat Section have approached the Council with a view to securing uniform rates and conditions for treatment of lodge members. Several conferences have been held between the Contract Practice Subcommittee and representatives of the section and the lodges, and negotiations are still proceeding. It is hoped that the terms desired by the section will be accepted by the lodges and thus place this work on a more satisfactory basis than in the past.

Adelaide Permanent Post-Graduate Committee.

As the annual meeting of the Association is to be held in Melbourne from September 9 to 14 next, the committee decided not to hold the usual post-graduate course in May. A series of twelve lectures (six medical and six surgical) have, however, been arranged, which commenced on May 2 last and will continue at weekly intervals until August 8 next. Mr. Victor Hurley, of Melbourne, delivered the "E. C. Stirling Lectures".

Control of Tuberculosis in South Australia.

Considerable delay on the part of the Government has taken place in regard to the recommendations made at a deputation from the Association to the Chief Secretary in May of last year.

The building for the Tuberculosis Clinic at the Adelaide Hospital was completed some months ago, but has not been used, and the Government has recently been approached by the Council in order to ascertain the reason for the delay.

Revision of Rules.

It has not been possible during the year to bring the new rules into operation. After the rules were passed the Council considered the time was opportune to have the Branch incorporated, and the solicitors of the Branch were consulted on the matter. At that time the new *Companies Act* was being considered by Parliament, and the Council was advised to wait until this was passed, as this Act would afford a most convenient form of registration. The new Act was not assented to until December, 1934, and the Council has now been advised by its solicitors that it would be better for the Association to be incorporated under *The Associations Incorporation Act* rather than *The Companies Act*, 1934, as this would obviate considerable office work and undue publicity, and at the same time confer practically all the advantages of incorporation under *The Companies Act*. The Council has decided to leave this matter in abeyance until the new rules have been approved by the Parent Association.

Annual Meeting of the Parent Association, 1935.

The annual meeting of the Association will be held at Melbourne from September 9 to 14 next, and it is anticipated that many members of the Branch will attend. The Council places on record its deep regret at the death of Sir Richard Stawell, the President-Elect of the Association, 1935-1936.

Hospital and Medical Services Insurance.

In November last correspondence was received from the Colonial Mutual Life Assurance Society, Limited, advising

that the financial and statistical statements of the medical and hospital services system of insurance from the commencement of operations to September 30 last disclosed an unsatisfactory state of affairs and indicated that the system operating had not proved to be a sound commercial proposition. The agreement with the various Branches provided that if at any time the scheme proved impracticable or unsatisfactory the Society could discontinue the same on twelve months' notice. The Society therefore asked the Council to absolve it from the undertakings given, and this has been done, following the action of the other Branches. All policies in force will, of course, be honoured.

The Council regrets that a courageous attempt by the Society to find a solution to a very difficult problem did not meet with success, and has informed the Society of its appreciation of the work performed.

Medical Officers to the Destitute.

Following the negotiations between the Council and the Government, of which members were informed in the last annual report, the Government informed the Council in August last that after carefully reviewing the whole position, and taking into consideration the financial position of the State, it had been decided to approve of an increase in the amounts of remuneration paid for the last year by 25%, in addition to bearing the cost of the supply of medicines from July 1, 1934.

Although the Council feels that the remuneration paid is still inadequate for the services rendered by the Medical Officers to the Destitute, members were requested to sign the necessary agreement with the Children's Welfare and Public Relief Department. The matter will be further considered by the Council when the present agreements expire on June 30 next.

Medical Act of South Australia.

Certain suggestions were made to the Medical Board of South Australia regarding the amendments to the present Act, but the Council has been advised that the present time is inopportune for the introduction of amending legislation.

Mental Defectives Act.

During the year consideration has been given to the *Mental Defectives Act* with a view to securing amendments of the Act to bring it into line with modern acts dealing with mental defectives. The matter has been referred to a subcommittee, and it is expected that a report will shortly be submitted to the Council.

Broken Hill Members.

In accordance with the resolution at the Special General Meeting in January last, the rules of the Branch have been altered to exclude Broken Hill from the area of the Branch, and the Broken Hill members have now become attached to the New South Wales Branch.

Representative on Central Council in London.

Sir Thomas Peel Dunhill, C.M.G., has been appointed Group Representative (which includes the South Australian Branch) on the Central Council for three years 1935 to 1938.

Australasian Medical Congress: Fifth Session.

The Council through the Federal Council issued an invitation to hold the next congress in South Australia during May or August, 1937. The invitation has been accepted, the actual date to be determined later on. An invitation had been accepted by the Federal Council for the previous session of congress to be held in Western Australia, but it was afterwards decided to hold the congress in Tasmania. Western Australia was not represented at the last meeting of the Federal Council, and it is felt by the Council that should Western Australia desire the fifth congress to be held there, South Australia should waive its claim in favour of Western Australia, and the Western Australian Branch has been informed.

Library Fund Account, December 31, 1934.

	£	s.	d.		£	s.	d.
To Adelaide University	5	0	0	By Balance brought down from December 31,			
" Depreciation	9	17	0	1933	514	10	11
" Balance	510	5	5	" Interest from Savings Bank		3	16
				" Transfer from Income and Expenditure			
				Account	51	15	0
	<u>£570</u>	<u>2</u>	<u>5</u>		<u>£570</u>	<u>2</u>	<u>5</u>

General Fund Account.

	£	s.	d.		£	s.	d.
To Telephone Account	12	1	6	By Balance brought down, December 31, 1933	2,831	1	7
" Balance	2,842	1	8	" Profit on Sale of Commonwealth Bonds ..	22	0	6
				" Income and Expenditure Account	1	1	1
	<hr/>				<hr/>		
	£2,854	3	2		£2,854	3	2

Balance Sheet as at December 31, 1934.

[illegible]

I certify that I have examined the books and vouchers of the British Medical Association as produced to me for the year ended December 31, 1934, and that in my opinion the above Balance Sheet correctly sets forth the financial position of the Association as at the above date and as shown by the books.

F. ST. JOHN POOLE, Honorary Treasurer.

WALTER C. DOBBIE, Secretary.

Adelaide,

May 20, 1935.

C. W. L. MUECKE.

**Chartered Accountant (Australia),
Auditor.**

Induction of President.

Dr. F. St. J. Poole then introduced the President for the ensuing year, Dr. D. W. R. Cowan, and wished him a successful term of office.

Dr. D. W. R. Cowan thanked the members for having elected him to the presidential chair.

Election of Office-Bearers.

Office-bearers for the ensuing twelve months were elected as follows:

Vice-Presidents: Dr. A. F. Stokes, Dr. G. H. Burnell.

Honorary Medical Secretary: Dr. C. B. Sangster.

Honorary Treasurer: Dr. F. St. J. Poole.

Members of Council: Dr. G. Wien Smith, Dr. C. Yateman.

Votes of Thanks.

A vote of thanks was accorded to the retiring members of the Council on the motion of Dr. A. F. Stokes, seconded by Dr. G. H. Burnell.

Alteration of Rule.

Rule 61 of the new rules of the Branch was withdrawn and the following was inserted in its place.

In the case of the death of the President during his term of office or of his resignation of that office, if the immediate Past-President is unable to act, the Council shall appoint one of its members to discharge those duties.

ANNUAL MEETING, MELBOURNE, 1935.

AMONG the entertainments in connexion with the annual meeting of the British Medical Association to be held in Melbourne next September are receptions by the State Government of Victoria and by His Excellency the Governor of Victoria, Lord Huntingfield. Dr. J. P. Major, the Honorary Local Secretary in connexion with the meeting, wishes it to be known that if members wish to receive invitations to these functions it will be necessary for them to notify him, not later than August 15, of their intention of being present at the meeting. A member should, when writing to Dr. Major, state whether he will be accompanied by his wife and/or daughter. Invitations will be sent to the member's address in his own State.

The Sections.

Some alterations have been made in the personnel of officers of sections. The sections which have been altered now stand as follows:

Section of Radiology and Radio-Therapeutics.

President: H. M. Moran, M.B., F.R.C.S., F.R.A.C.S. (Sydney).

Vice-Presidents: L. J. Clendinnen, M.B., B.S. (Melbourne), R. A. Gardner, M.B., D.M.R.E. (Cairo), Major D. B. McGrigor, O.B.E., M.B., D.M.R.E. (Frinton-on-Sea), D. I. R. Smith, M.B., B.S. (Western Australia).

Honorary Secretaries: F. G. Stephens, M.B., B.S. (12, Collins Street, Melbourne), A. J. G. Mackay, M.B., F.R.C.S., D.M.R.E. (Radiological Clinic, East Melbourne), B. W. Winder, M.B., F.R.C.S. (The Middlesex Hospital, W.I.).

Section of Neurology and Psychological Medicine.

President: Professor Edwin Bramwell, M.D., P.R.C.P., F.R.C.P. (Edinburgh).

Vice-Presidents: A. W. Campbell, M.D. (Sydney), Professor J. P. Lowson, M.D. (Brisbane). (Two Vice-Presidents to be appointed.)

Honorary Secretaries: L. B. Cox, M.D., M.R.C.P. (37, Toorak Road, Malvern, S.E.5), H. F. Maudsley, M.C., M.D., M.R.C.P., D.T.M. (8, Collins Street, Melbourne), J. K. Slater, M.B., F.R.C.P. (7, Walker Street, Edinburgh).

Section of Ophthalmology.

President: A. J. Ballantyne, M.D., F.R.F.P.S. (Glasgow).

Vice-Presidents: J. Lockhart Gibson, M.D., F.R.A.C.S. (Brisbane), F. G. Antill Pockley, M.B., M.S. (Sydney), H. M. Traquair, M.D., F.R.C.S. (Edinburgh), Lieutenant-Colonel R. E. Wright, C.I.E., I.M.S., B.A., M.D. (Madras).

Section of Pathology and Bacteriology.

President: Professor A. Murray Drennan, M.D., F.R.C.P. (Edinburgh).

Vice-Presidents: Professor J. B. Cleland, M.D., Ch.M. (Adelaide), W. Keith Inglis, M.D., M.S. (Killara, New South Wales), E. F. D'Ath, M.B., Ch.B. (Dunedin), W. J. Penfold, M.B., C.M. (Melbourne).

Honorary Secretaries: C. H. Kellaway, M.C., M.D., M.S., F.R.C.P. (Melbourne Hospital, Melbourne), Professor H. A. Woodruff, M.R.C.S., L.R.C.P. (48, Fellowes Street, Kew, E.4).

Section of Public Medicine (Tuberculosis, Industrial and Tropical Hygiene) and including the History of the Development of Medicine in Australia.

President: Sir Henry Gauvain, M.D., M.Ch., F.R.C.S. (Alton).

Vice-Presidents: Sir R. W. Cilento, M.D. (Canberra, Federal Capital Territory), C. E. Hercus, D.S.O., M.B., Ch.B. (Dunedin), G. Carmichael Low, M.D., F.R.C.P. (London), C. M. Murray, D.S.O., M.A., B.Ch., M.R.C.S., L.R.C.P. (South Africa).

Honorary Secretaries: H. M. James, M.B., Ch.B. (22, Mayfield Avenue, Malvern, S.E.4), F. R. Kerr, D.S.O., M.D., D.P.H. (27, Monomeith Avenue, Canterbury), Professor R. H. Parry, M.D., M.R.C.P., D.P.H. (Bristol Health Offices, 40, Prince Street, Bristol).

Section of Dermatology.

President: S. Watson Smith, M.D., F.R.C.P., M.R.C.P. (Bournemouth).

Vice-Presidents: L. P. Johnston, M.B., M.S. (Sydney), Herman F. Lawrence, M.R.C.P. (Melbourne), J. E. McGlashan, M.C., M.B., B.S. (Perth, Western Australia), W. C. T. Upton, M.B., Ch.M. (Adelaide).

Honorary Secretaries: R. R. Wettenhall, M.B., Ch.B. (85, Spring Street, Melbourne), Alice B. Carleton, M.B., B.Ch. (45, Banbury Road, Oxford).

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Langton, Cecil Digan, M.B., 1933 (Univ. Sydney), c.o. Bank of New South Wales, 29, Threadneedle Street, London.

Meurer, Theodore Christian, M.B., B.S., 1931 (Univ. Sydney), 35, Uralba Street, Lismore.

Spark, Edward William, M.B., B.S., 1929 (Univ. Sydney), 75, Penkivil Street, Bondi.

Correspondence.**THE USE OF 300 KILOVOLTS PEAK IN X RAY THERAPY.**

SIR: I have read with great interest and attention Dr. Nisbet's article in your issue of June 15 on "The Use of 300 Kilovolts Peak in X Ray Therapy". As a result I cannot agree with the conclusions he draws from his own figures, nor with a number of general dogmatic statements contained therein.

Regarding the question of depth dose in its relation to kilovoltage and filtration, the experimenter has made an industrious series of measurements. Quoting his own figures, the results may be summarized in the following table, shorn of all unessentials:

Kilovolt Peak.	Filter.	Depth Dose.
200 ..	1 mm. Cu. ..	37%
300 ..	1 mm. Cu. ..	38%
200 ..	4 mm. Cu. ..	26%
300 ..	4 mm. Cu. ..	33%

Dr. Nisbet then informs us on the strength of these figures that "it is necessary to increase the filtration as well as the voltage if the greatest increase in depth dose is to be obtained". Surely the net result, as shown by these figures, of increasing the voltage from 200 to 300, and at the same time adding three millimetres of copper filtration, has been to decrease the depth dose from 37% to 33%—decrease of 11%.

I fail to understand just why this happens, because I would expect a slight increase, but the discrepancy suggests that all is not well with the conceptions of those who perferentially advocate the merits of high voltage and high filtration.

Personally, I have long suspected that under clinical conditions, given a voltage of 200 kilovolts peak or over, the depth dose depends more upon the size of the field than upon either voltage or filtration, and the above figures would seem to support that belief.

Still in connexion with depth dosage Dr. Nisbet has given us a series of graphs. Graph No. II is practically a record of tube output measured through various filters at the surface of his test object. Graph No. I embodies a corresponding series of measurements at a depth of ten centimetres in the same test object. Because the curves in Graph No. I approach the horizontal axis as they pass towards 300 kilovolts, the conclusion is drawn that it is no use proceeding higher in voltage with the expectation of increased depth dose. Now Graph No. II—a mere record of tube output—shows the same asymptotic approach to the horizontal axis with increasing voltage and the forms of both sets of curves are almost identical. Hence it is evident that the so-called significant flattening toward 300 kilovolts peak in Graph No. I is merely a function of the tube output and has no significance whatever in connexion with depth dose. The two sets of curves demonstrate conclusively that the amount of radiation reaching the depth depends ultimately on the amount of radiation we apply to the surface—which is an axiom in any case.

If Dr. Nisbet wishes to demonstrate a relation between depth dose and voltage, he must plot his voltage against his depth dose as derived from his measurements. In this case his depth dose might be reasonably represented by the ratio of the time to record "5 r" at the surface to the time to record "5 r" in the depth.

I have performed these calculations (on Dr. Nisbet's own figures in Table III) with the following result, expressed in tabular form for varying voltages and filtrations:

Depth Dose per Centum.

Kilovolts Peak.	Millimetres of Copper Filter.			
	1	2	3	4
200	37	32	21	25
225	40	33	30	30
250	37	26	30	33
275	35	33	30	32
300	38	31	29	32

Handled correctly in this way, the analysis does not bear out the writer's conclusions. It shows:

(a) That no increase in depth dose occurs with increase in voltage above 225.

(b) That increased filtration actually decreases the depth dose in every case.

(c) That the optimum radiation is in the region of 200-225 kilovolts peak with one millimetre of copper as filter, that is, the radiation which is in common use at present.

The correctness of these conclusions, it is obvious, depends upon the correctness of the initial measurements, but they seem the only conclusions that can be drawn on the figures as given.

Nor can I accept in any more complaisant mood the remarks upon the merits of high voltage short wave therapy and its adjuvant doctrines of increased differential and selective wave-length effect. Here Dr. Nisbet is fishing in very troubled waters, but in spite of this gives our readers the clear impression that the fish is landed, cleaned, scaled, stuffed and cooked. He then hands it up to them on a platter for consumption, replete with sauce and garnished with the conventional sprig of parsley, as is shown by the following quotations (page 739):

... the fact that a bundle of much shorter wave-lengths is being produced, which is more destructive by far to the tumour tissue. This in transit does not damage normal cells, including those of the epidermis. (The body of the fish.)

... Are these shorter waves then of greater therapeutic value than those emitted by a tube activated at lower voltage?

... Modern investigators say that this is so and the use of radium *en masse* is thought to be of greater value than deep X rays on account of the greater number of shorter wave-lengths emitted. (The sauce.)

... In addition there is a greater permissible skin dose with higher voltage amounting to 50%. (The parsley.)

The matters so blithely settled include the most contentious in modern radiology. It is true that a large body of authoritative opinion maintains such theories, but it is also true that an equally large authoritative body denies them. Personally I cannot conceive any physical quality or action which will enable radiation to damage pathological tissue without at the same time exerting at least a comparable effect on normal tissue. I have previously set on record in your journal my belief that there is an equal initial injury to both components, with a differential effect brought out by the varying recuperative responses of the different tissues concerned. It was then indicated how extension of the time period improved the differential result, thus explaining in part the superior results obtained with interstitial radium treatment and long-continued X ray dosage. Altogether the whole matter of short wave therapy is still so contentious and so complicated that no dogmatic statement can be at present accepted, and a cautious open mind is the only scientific attitude with temporary hypotheses for present guidance. Referring to "The Report of the Committee on Radiation and X-Ray Therapy" (*Proceedings of the Royal Society of Medicine*, Volume XXVII, November, 1933), under the heading "Use of X-Rays over 200 K.V.P.", we find that "the Committee is unanimously agreed that it is essential to investigate clinically radiation of this type". With this recommendation all can heartily agree, realizing, however, that to date most X ray achievements have been carried out with radiation from 180-200 kilovolts peak and that higher voltages will have to prove their worth before we forsake the old comparatively inexpensive tool for the more costly new. To date the exponents of the ultra-high voltage therapy have been rather silent as to any very definite achievement. It must therefore be recognized that the application of radiation above 200 kilovolts peak is still in that early experimental stage, where promising results are in view, but much remains for investigation and proof.

In conclusion I must concede Dr. Nisbet his sprig of parsley as a fact, though I have one pertinent comment to make in this regard. If it takes 50% more radiation to produce an equal effect with short wave radiation on our best understood biological indicator, the skin, then it is highly possible and even probable that it takes 50% more also to produce an equal effect on the tumour. The increased tolerance of the skin, with present measuring

methods, is accepted, but to the best of my knowledge no considerations as to possible increased tolerance of the tumour have been brought forward.

Yours, etc.,

137, Macquarie Street,
Sydney,
June 19, 1935.

ERIO W. FRECKER.

SIR: In these times, with cancer treatment continually on the front page of the news, Dr. Nisbet's attempt (THE MEDICAL JOURNAL OF AUSTRALIA, June 15) to give us guidance in certain aspects of its radiotherapy is very welcome.

As radiologists we are being asked to take the responsibility of giving advice to hospitals concerning expensive high voltage deep therapy installations, and it behoves us to examine carefully the claims made for such equipment.

While appreciating the care and ingenuity of Dr. Nisbet in his investigations, I find it difficult to follow his argument in asking us to adopt the arbitrary 275 kilovolts in place of the 200 kilovolts now generally available. Some of his findings appear to admit of an alternative conclusion to that he draws, and I would appreciate his criticism of my point of view in these matters.

The ionization chambers in use measure the absorbed and not the total energy of the incident radiation. They are useful in registering and reproducing X ray doses with the radiation qualities now available. This depends on the parallelism of the absorption curves of these rays in air and human tissues. I would like to know of the research which enables us to continue confidently our reliance on comparative ionization measurements when the wide variations of voltage and filtration suggested for future use are being discussed.

There is no doubt that the need for an increased intensity of depth dose can be met by higher kilovoltage. This involves great expense, and I wish to suggest that installations of 200 kilovolts can be used satisfactorily to obtain adequate depth doses until such time as improved biological effects are definitely associated with the X ray spectrum of some other kilovoltage. At present there is nothing to indicate whether this happy result will be obtained by radiation generated below or above 200 kilovolts.

I would eliminate from the discussion the question of saving time in giving treatments. What evidence there is suggests that longer exposures rather than shorter ones have more beneficial effects.

At about 10 centimetres depth in body tissues a beam of penetrating X rays loses half its surface ionizing power. At this level dispersion is more potent than direct absorption in robbing the beam of its energy. The latter depends on the wave-length, while the former does not show a great variation with this factor. Up to 10 centimetres depth increased penetration is noticeable when the wave-length is shortened; then, dispersion becoming all important, further shortening the wave-length has not a proportionate value in increasing penetration.

Radiation from 200 kilovolts with 1.0 millimetre of copper and 1.0 millimetre of aluminium filtration has an effective wave-length of 0.16 Angström unit. From 50 centimetres distance it produces about 40% of its surface energy at 10 centimetres depth in a water phantom (Quimby has shown that a water phantom is as good as any other except for application to the chest and oral cavity). Radiation from 700 kilovolts with 5.0 millimetres of copper and 1.0 millimetre of aluminium filtration has an effective wave-length of 0.05 Angström unit, and from 50 centimetres distance produces about 47% of its surface energy at 10 centimetres depth. If the 200 kilovolt tube is moved to 80 centimetres distance, the depth dose reaches near 50%. The exposure time is increased two and a half times. With 30 milliamperes available at this voltage, instead of the 5 used with 700 kilovolts, the times may be approximated if necessary. This is an important point for consideration when increased depth dose alone is required. The cost of adjusting the 200 kilovolt installation is small compared with the purchase of 700 kilovolt equipment.

Now certain effects of increasing filtration are worthy of discussion. The effective wave-length of a beam of radiation may be shortened by increasing filtration up to a point when further increase only impairs the intensity of the beam without further significant shortening of the effective wave-length. With 200 kilovolts this optimum maximum filtration is reached with 2.0 millimetres of copper, giving an effective wave-length of 0.12 Angström unit. This is illustrated in Dr. Nisbet's measurements with 4.0 millimetres of copper over the range of voltages tested. It would appear that more valuable comparative intensity measurements would be obtained if the optimum maximum filtration was not exceeded with each voltage used. Aluminium is added to the filter solely to absorb the secondary radiation of the copper. This is achieved by 0.25 millimetre and no purpose is met by using more than 0.5 millimetre. The thicker filters merely decrease the general intensity of the radiation without making it more homogeneous or improving the depth dose.

The difference in skin reaction when higher voltages are employed from that observed with lower potentials has been described by several workers and different explanations offered. But a full discussion of this apparent differential action of radiation of different wave-lengths must be postponed.

On biological grounds there is a suggestion that clinical judgement is seeing better results with higher voltages. Modern investigators are quoted as reporting that the shorter wave-lengths are more destructive by far to tumour tissue. Dr. Nisbet does not include a reference to satisfactorily controlled research supporting this view. At present I do not know of any. In this regard I would like to be sure that clinical judgement is not personal bias. In medical matters the boundary between these qualities is sometimes absent.

Hoping Dr. Nisbet will be able to continue his efforts in the solution of our problems, and acknowledging my debt to the recent writings of Quimby, Landauer, Darnell and Mutscheller.

Yours, etc.,

F. J. GWYNNE.

30, Princes Street,
Auckland,
New Zealand,
June 28, 1935.

"DOCTOR."

SIR: The well informed criticism in one of our powerful dailies raises an important point and deserves the attention of the Council of the British Medical Association. Is a medical practitioner who does not hold the M.D. entitled to call himself "Doctor"? Perhaps the public are largely to blame for the misuse of the word doctor. They persist in regarding every medical practitioner as a doctor and vice versa. Thus a doctor of laws or a doctor of philosophy, while at a holiday resort, may be urgently requested to attend to an accident case. The medical practitioner is primarily to blame for this, because of his prerogative claim to the distinguishing degree. Herbalists and osteopaths are forbidden by law to use the term doctor. A man with nothing more than M.B., B.S. is no more entitled than they to use the word as a prefix to his name. It is a false claim on his part, and he knows it.

I believe that, some time ago, a move was initiated by some members of the British Medical Association to correct this inaccurate self-classification, but apparently the opposition of those who hold no higher degrees prevented any correction being enforced.

The members of the Australasian College of Surgeons are rightly determined to raise the standard of surgery in this country and hope that the public will learn to discriminate between a man who is properly qualified to undertake major operations and the one who is not. The surgeon makes no false claims, and the use of "Mr." has now become a tradition with him. Perhaps the recently formed Australasian Association of Physicians will

advocate that only those who hold a doctor's degree in a recognized university should call themselves doctor, so that we shall see honest nameplates, such as "John Smith, M.B., B.S."

This practice would raise the standard of medical education and be an incentive to every young graduate to know his job thoroughly and to rise from the ranks. Furthermore, it is only fair to make some distinction between a newly-fledged practitioner and a man who has won the senior degree by the expenditure of much time and very hard work.

We are informed that there is a strong feeling among dentists who hold the B.D.Sc. that they should be allowed to use the title "doctor" to distinguish them from "recorded" dentists. They are entitled to do so just as much as a man with M.B., B.S.

But why not be honest? Why not cease making false and misleading claims? The medical profession pays great attention to ethics. If we are consistent, we must correct this irregularity.

Yours, etc.,

"PHYSICIAN."

Collins Street,
Melbourne,
July 8, 1935.

Congresses.

A CONGRESS ON THERAPEUTICS.

THE annual general meeting of the Union Therapeutique will be held on October 9, 1935, at the Faculty of Medicine, Paris. The subjects for discussion include: the present-day knowledge of the male hormone, the surgery of the splanchnic system in arterial hypertension, antimony compounds in therapeutics, the physico-chemical and glandular equilibrium in the treatment of visceral spasm, spasmogenic substances and their antagonists, nerve sedative treatment of apasm.

Further information may be obtained from the Secretary-General, Dr. G. Leven, 24 Rue Téhérou, Paris.

AMERICAN CONGRESS OF PHYSICAL THERAPY.

THE fourteenth American Congress of Physical Therapy will be held at Kansas City, Missouri, on September 9, 10, 11, 12, 1935. The congress will be preceded by an instruction class covering the field of physical therapy on September 5, 6 and 7. Full information may be obtained on application to the American Congress of Physical Therapy, 30, North Michigan Avenue, Chicago, Illinois, United States of America.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on July 1, 1935.

The following diplomas were awarded:

Diploma in Public Health: James Robert Shannon, M.B., Ch.M.

Diploma in Tropical Medicine: Harry Lauder Carruthers, M.B., B.S., Alexander Small Frater, M.B., B.S. (Melbourne), George Frederick Lumley, M.B., Ch.M., Leonard

Alexander Maclean, M.B., B.S. (Adelaide), Ronald Elliott Murray, M.B., B.Sc., and Thomas Frank Tonkin, M.B., B.S.

The Marion Clare Reddall Scholarship for 1935 was awarded to Dr. J. K. Maddox, M.D., Ch.M.

It was resolved that the "John Gurner and Frederick Ebsworth" Scholarship be awarded at the first year examination in the Faculty of Veterinary Science for proficiency in chemistry, physics, botany and zoology.

On the recommendation of the Faculty of Medicine it was resolved to approve an amendment of the By-Laws to provide for (a) the omission of the subject of therapeutics and materia medica from the fourth degree examination, (b) the inclusion of the subject of practical pharmacy in the fourth degree examination, and (c) the inclusion of therapeutics as a subject of the final degree examination.

Proceedings of the Australian Medical Boards.

QUEENSLAND.

THE undermentioned have been registered, pursuant to *The Medical Acts 1925 to 1933*, as duly qualified medical practitioners:

Corbin, John Ogilvie, M.B., B.S., 1933 (Univ. Adelaide), Brisbane.
Gundelach, Ralph Henry, M.B., B.S., 1931 (Univ. Sydney), Stanthorpe.
Leiper, Alexander, M.B., Ch.B., 1925 (Glasgow), Innisfail.
Morton, Charles Robert, M.B., B.S., 1933 (Univ. Sydney), Toowoomba.
Hallows, Grace Isabel, M.B., B.S., 1932 (Univ. Melbourne), Brisbane.
Herrington, Alexander Clement, M.B., B.S., 1925 (Univ. Melbourne), Blackall.
Rich, Harold George, M.B., Ch.M., 1925 (Univ. Sydney), Toowoomba.
Balmer, Katharine Mary Raeburn, M.B., B.S., 1935 (Univ. Melbourne), Brisbane.
Shelton, James Newman, M.B., B.S., 1921 (Univ. Melbourne), Brisbane.

VICTORIA.

The undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1928*, of Victoria, as duly qualified medical practitioners:

Ainscow, Gladys Ellen, M.B. et Ch.B., 1917, D.P.H., 1921 (Birmingham), 11, Peacock Street, Mid. Brighton, S.3.
Balmer, Katharine Mary Raeburn, M.B., B.S., 1935 (Univ. Melbourne), Brisbane General Hospital, Brisbane.
Claridge, Eric Julian Carré, M.B., B.S., 1935 (Univ. Melbourne), 25, Winter Street, Malvern, S.E.4.
Donald, Russell Hughes Oxby, M.B., B.S., 1935 (Univ. Melbourne), Taringa, 21, Hopetoun Road, Toorak, S.E.2.
Dyring, Valdemar Carl, M.B., B.S., 1926 (Univ. Melbourne), Were Street, Brighton Beach.
Ramsden, Edward Maxwell, M.B., 1908 (Univ. Sydney), High Street, Glen Iris, S.E.6.

Additional diplomas:

Alexander, James Buchanan, M.D. (Melbourne), 1935.
Warden, Ramsay, D.G.O. (Melbourne), 1935.

Obituary.

WILLIAM HENRY HARRIS.

WE regret to announce the death of Dr. William Henry Harris, which occurred on July 8, 1935, at Chatswood, New South Wales.

EDWARD WILLIAM BUCKLEY.

WE regret to announce the death of Dr. Edward William Buckley, of Tamworth, New South Wales, which occurred recently in London.

THE STAWELL MEMORIAL FUND.

THE following subscriptions have been received for the Stawell Memorial Fund:

- £50: Anonymous.
 £10 10s.: "Radiological Clinic."
 £10: A. F. Davenport, E. J. Stock, H. L. Stokes.
 £5 5s.: R. M. Downes, W. R. Groves, J. W. Barrett, J. Newman Morris.
 £5: R. R. Wettenhall.
 £3 3s.: R. Fowler, V. Hurley, J. H. Kelly.
 £2 2s.: N. J. Parker, H. Bush, E. W. Sutcliffe, K. C. Ross, W. E. Summons, A. E. Deravin.
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THE GEORGE MACDONALD TESTIMONIAL FUND.

THE undermentioned subscriptions have been received for the George MacDonald Testimonial Fund:

- £1 1s.: W. Moppett, H. R. Sear, K. B. Voss, A. H. Tebbutt.

Diary for the Month.

- JULY 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 JULY 24.—Victorian Branch, B.M.A.: Council.
 JULY 25.—South Australian Branch, B.M.A.: Branch.
 JULY 25.—New South Wales Branch, B.M.A.: Branch.
 JULY 26.—Queensland Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xiii, xiv, xv.

AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Ear, Nose and Throat Surgeon.

LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer.

METROPOLITAN INFECTIOUS DISEASES HOSPITAL BOARD, ADELAIDE, SOUTH AUSTRALIA: Assistant Medical Officer.

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

PRINCE HENRY HOSPITAL, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officers, Honorary Radiologist.

SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Junior Resident Pathologist.

THE TOWNSVILLE HOSPITALS BOARD, TOWNSVILLE, QUEENSLAND: Resident Medical Officer.

THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY, NEW SOUTH WALES: Honorary Clinical Assistants.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointment and those desiring to accept appointments to any COUNTRY HOSPITAL, are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	Office of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

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